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# COMPTON'S

# PICTURED ENCYCLOPEDIA AND FACT-INDEX

Interesting · Accurate · Up-to-date

TO INSPIRE AMBITION
TO STIMULATE THE IMAGINATION, TO PROVIDE THE
INQUIRING MIND WITH ACCURATE
INFORMATION TOLD IN AN INTERESTING
STYLE, AND THUS LEAD INTO
BROADER FIELDS OF KNOWLEDGE,
SUCH IS THE PURPOSE OF

THIS WORK





Volume 6

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#### COMPTON'S PICTURED ENCYCLOPEDIA

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### Here and There in This Volume

At odd times when you are just looking for "something interesting to read," without any special plan in mind, this list will help you. With this as a guide, you may visit faraway countries, watch people at their work and play, meet famous persons of ancient and modern times review history's most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list is not intended to serve as a table of contents an index, or a study guide. For these purposes consult the Fact Index and the Reference Outlines.

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### HERE AND THERE IN THIS VOLUME

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357 How can water run uphill? 457 p eture If a boy were as good a jumper as the grasshopper how high could be leap? 168

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How is friction used to start a fire? 3 6 What kind of compass is independent of the earth's

magnetism<sup>2</sup> 238 Why was Prince Henry of Portugal called the Navi

gator > 940 How big does a halibut grow? 248

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minister of state? 130

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some of them 451 Why can felt be made from animal hairs but not from fibers I Le silk or linen? 243 p cture

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men to perish in the Arctic? 437 What is the name of the spring fest val held yearly in

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a r from an applane? 172 What famous French author was known as the exile of Guernsey 2 411

What Greek god had wings on his shoes? 348

### KEY TO PRONUNCIATION

Pronunciations have been indicated in the body of this work only for words which present special difficulties. For the pronunciation of other words, consult the Fact-Index Marked letters are sounded as in the following words cape, ăt, fâr, fâst, what, fall;  $m\bar{e}$ , yt, fērn, thêre;  $\bar{i}$ ee, bǐt;  $r\bar{o}$ w, wôn, fôr, nốt, do; care, bắt, rude, full, bárn; out;  $\bar{u}$ =French u, German  $\bar{u}$ ;  $\bar{g}$ em,  $\bar{g}$ o, thin, then;  $\bar{n}$ =French nasal (Jea $\bar{n}$ ); zh=French z (z in azure); z=German guttural z-

AINSBOROUGH THOMAS (1727-1788) As a small boy Thomas Gainsborough sketched every tree gate stump and at le within miles of his house and throughout his career his chief love was landscape punt ng Yet he won his great popularity as a painter of portraits

Gainsborough was born at Sutbury in Suffolk County England When he was 14 his parents sent l im to London as as stant to Hubert Gravelot an illustrator and engraver and two years later he en tered St Martin a Lane Academy where he studied

under Francis Hav man a skillful painter of portraits and historic scenes He marned at 19 and for 14 years lived quetly at Sudbury and Ipswich painting and studying music and nature. Then he moved to gay and fashionable Bath and found it necessary to increase his means Since he could not sell his landscapes he began to concentrate on por trait painting and had immediate eurcesa Some years later he moved to London and became a favor ite painter of the royal family He was one of the original members of the Royal Academy (founded 1768) but withdrew in 1784 because of lisagreements over tle hanging of his

Ga nsborough was the first of the great English landscape painters Herefused to copy foreign schools of painting but put down what he himself

p intings

saw in nature. His land capes are feathery and poetic but have correct draftsmansh p He also ranks as one of the great English portrait painters. His portraits furnish a valuable record of the elegance and graciousness of 18th century England

Among Gansborough s famous landscapes are Cornard Wood The Market Cart The Water ng Place and The Bridge His portraits in clude The Honourable Mrs Graham David Garrick Mrs Suldons Mrs Robinson (Perd ta) The Duchess of Devonshire His famous Blue Boy hangs in the Huntington Art Gallery at San Marino Calif GALAJIAD Seated at d noer one day the Knights of the Round Table were talking of the Holy Grail the can out of which Christ drank at the Last Supper Suddenly according to Arthurian legends the torches A FAMOUS PORTRAIT BY CAINSBOROUGH

in the great hall went out Across the dark ness streamed a band of eilver light Against that faintly as through a mist they saw a flush of rose Only Sir Calahad saw the cup clearly- all crimson and glowing like a ruby and heard a voice which sad Galahad fol

los me The son of Sir Lancelot and the far Elaine of Astolat Galahad was the noblest of all knights and his faith and pur ity gave him powers denied to others The sacred vessel accord me to the story had been brought to Bri tain by Joseph of Ar mathea but when the land fell into wickedness it was h d den away and the search for it became the noble quest of the knights of Ling Arth ur a Round Table All the knights swore a yow to I ve a holy I fe for a year and a day while they searched for the Holy Grail

Only four returned



Sir Born and Sir Lancelot had seen the Gra lin visions



Painting by George Frederick Watts

SIR GALAHAD, THE PERFECT KNIGHT

Oh my friend ' cried Galahad the Holy Grad shines always before blood red and glowing like a star guiding me to Heaven It gives me victory over every sin and shame and wrong in the world Come with me

They went out into a storm and over a hillton Galahad ran eagerly before acro s a bridge which spanned a black marsh to the sea and disappressed into the night As Perceval knelt veeping and pray ing, there again came the shaft of silver I ght and on it the glowing Grail In the morning he found Galahad a body beautiful thin and worn as a saint s and buried it by the sea.

Because of pious zeal repentance of sins and goodness said hing Arthur til ree of you have had a vision of the Grail But only Galahad really found

the sacred cup

The story of Sir Galahad is treated in Malory's Morte d Arthur and in other medieval romances It is also the theme of Tennyson's Sir Galahad and The Holy Grail in his Idells of the hing the Arthur King Round Table )

GALÁPAGOS (qualid pa qua) ISLANDS Some 600m les off the coast of Ecuador the Galapages Islands 1ft their gaunt lava ridges and reaks out of the Pac fic

are scattered over an area about 200 miles in diam eter directly astride the Equator But the transcal heat is moderated by the moist southeast trade winds and by the cool Humboldt or Peruv an Cu rent whose northern I m t is in this vicin ty Many of the islands have both English and Spanish names The Lirgest is Al bemarle (Isabela) about 75 miles long Here at the southern end a volcanie cone rises nearly 5 000 feet the highest point in the group The other chief islands in order of size are Indefatigable (Santa Cruz) Narborough (Fer nandina) Chatham (San Crist(bal) James (San Salvador) Charles (Santa

Ocean Nine islands and

about fifty 1 lets and reefs

María) Bindloe (Marchena) Hood (Española) and Abingdon (Pinta) About a hundred miles northwest of the main group are the

islets of Wenman and Culpepper

The Galápagos are so desolate that they have been called World's End From the shore the land rises in a series of volcanic craters. Perhaps as many as 2000 cones dot the island. The windward coasts drenched by mists, are tangles of mangrove swamps

On the dry leeward coast at the north and west of each sland gray lava cliffs rear stark out of the sea or thin beaches of white sand recede to desert growth of cactus thorn trees and barbed grass The uplands often swathed in clouds are matted with growth chiefly bursers thorn thistle and search Here run falls in the winter filling rocky pools but flowing strings are rure Flies plague the explorer by day and mosquitoes by night. The harsh lava emders cut shoes to ribbons

Peculiar Animais on the Islands

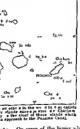
The islands are remarkable for their animals When Charles Darwin the first of several sc entists to vis t the Galfmages came here in 1835 he found that half the birds and plants were different from species in other parts of the world About a third of the shore fish and nearly all the rentiles also differed These variations beloed to suggest to Darwin the theory of evolution set forth in his Origin of Species, (see Darwin Charles)

As man has made few attempts to settle the Galiregoe the an maly show little fear Grant land ferranan three feet or more in length bask under cactus like prehi tor c dragons Sea iguenas swarm the coastal rocks which are frequented also by herds of sea I one

and southern seals Among the birds peculiar to the

islands are species of peli can penguin il ghtless cormorant heron dove finch mockingburd, hawk

and albatross An occasional giant tor touse recalls the days when these monsters were so ehundant that Spanish ev plorers named the islands for them from the Span ish word palápago touse Some weighed 200 nounds or more and were strong er ough to carry a man In the days of sailing sh ps they were a source of fresh meat Sailors caught them by the hun dred and dumped them into the hold where the tortoises lived nithout food or water until needed Early in the 20th century Ecuadorans slaughtered enormous numbers for oil



**CALAPAGOS ISLANDS** 

MICH PE AGO DE CO OT I

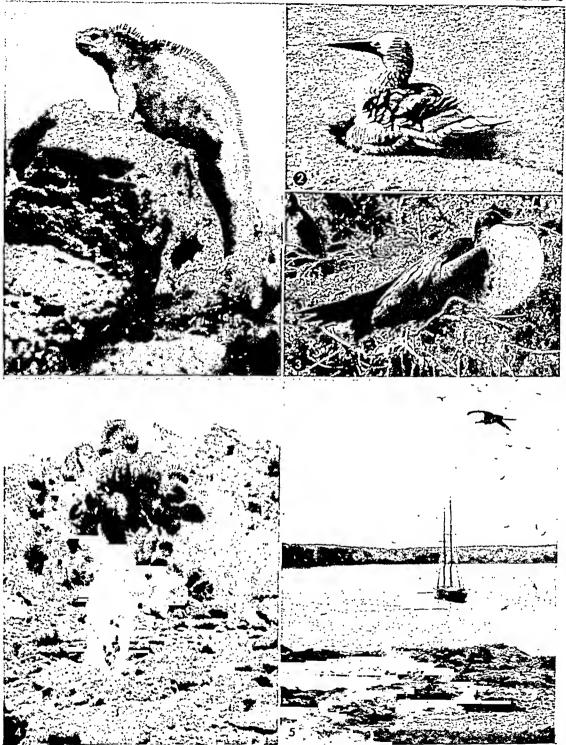
SCHE OF M S

On some of the larger blands roam wild dogs cats goats burros and even some cattle-descendants of animals left here by passing vessels

Haunts of Pirates and Sea Rovers

The Galfpagos were discovered in 1535 by the Span ish bishop of Panama but no attempt was made to settle them Late in the 17th century the islands became hideouts for buccaneers and sea rovers,

## BIRDS AND REPTILES OF THE BLEAK GALAPAGOS ISLANDS



A marine iguana suns itself on jagged, black volcanic rock.
 Boobles nest in the crater of a volcano.
 Frigate, or manowar, birds are abundant. Notice the inflated air sac of this bird. It is a vivid scarlet color.
 Lava and cactus characterize the scenery of bleak South Seymour Island.
 Darwin Bay is named for Charles Darwin, who first described the islands. The ship, with a frigate bird flying over it, was used by an expedition of the American Museum of Natural History.

including the famed Wilham Dampier Here too came Alexander Selkirk (Robinson Crusce) in 1709 after his rescue from the Juan Fernández islands Borned treasure has been found

After being unclaimed by any nation for nearly 300 years the Galápagos were annexed by Ecuador in 1832 Ecuador's first few attempts to colonize the islands ended in bloody revolts by the settlers, who had despured at the lard hang and iron rule In 1892 Tourdor officially named the islands Archive loos de Colon Chatham is now the center of government It's only town Progress is built back in the hills and its

few hun leed people grow coffee frust and sugar cane Wreel Ray on Chatham is the chief port of the islands But fishing vessels from California and elsewhere also anchor at Alberrarie and Indefatigable to eatch t ma To defend the western ant rough to the Pan m Canal in the second W rl War the United States with the consent of Laux dor set un naval a r i aca Aria 2868 - mare miles population (1950 ren 9 19) 1 346

GALILEO (adl I lou Itil an on-le 18 o) (1564-1642) The first astronomer to work with the telescope d scoverer of the pendu ium s laws and founder of modern physics was Galt

leo Gairles (usually kno vn as Gal leo) He was bo n in Pisa Italy and died 8 years later within a year of Newton's birth With his telescopes the monder of he age he discovered the mountains of the moon four satell tes of the planet Jup ter and the pecul er appearance of Saturn which was later shown to be due to a g eat ring or a ser es of rings sarrounding that planet

When Galileo was a youth of 19 to saw a famp in the eathedral at Pisa aminging regularly. He realizedwhat no one had realized before—that a pendu um swinging to and fro could be used to measure time and so laid the foundation for the invention of the modern clock (see Pendulum) He also proved that falling bodies however heavy or light fall at the same rate. The story goes that he proved this by dropping objects from the leaning tower of Pien (See

Gravitation ) Gal leo was a brilliant scholar with a quick and penetrating mind He held the professorship of mathematics in the universities of Pisa and Padon but in 1610 he left Padua for Florence where he lived most of his remaining years

Galileo made his first telescope with a pece of organ pipe placing a lens at each end It magnified only three times but later he made a telescope that magnified 30 t mes (see illustration with Telescope) With these he saw the mountains on the moon s sur face found that the Milky Way was a mass of very fairt stars, and discovered the largest four satellites of the planet Jupiter What he saw through his telescopes also convenced him of the truth of Conernicus view that the earth rotates on its axis and revolves around the sun. His ardent support of this view was the cause of difficulties with the church. In 1816 he was given a formal warning but nevertheless he again bros aked the indignation of the church authorities by

publishing a dialogue on The Great Systems of the Universe which offende i by its misuse of Holy Scripture as well as by its biting

Sature For this publication he was sun moned before the Inquisition in October 1632 No one knows what happeued during his examination but we do know that he nittered a formal recanta tion of his views and was compelled by the tribunal to five in str ct scelusion for the rest of his life There is a etory that as he rose from his knees he whispere I defrantly Nevertheless it does move -referring of course to the earth but this is a fiction invented



During the fast e ght years of his long life Galileo hard in retirement near Florence but his interest in science never waned His most admired and perhaps most valuable book Discussions of the New Sciences was published during this period. In this work he summarized has lifelong studies on the principles of mechanics Only when blindness overtook him in 1637 ded Cableo law aside his telescope. Still continuing his scientific meditations he dictated notes and correspondence almost to the day of his death Jan 8 1642 Be was buried at Florence in the cathedral of Santa Croce where an impressive monument commemorates his brilliant researches

Galileo achieved his greatest reputation as an astronomer but his chief service to ecience lay in establishing certain fund invental principles of dynam as such as the law of falling bodies the discovery that the path of projectiles is a parabola the demon stration of the laws of equilibrium and an account of the true principle of flotal on He al o devised an elementary form of the thermometer invented the bydrostatic balance for determining the specific grav I w of solid objects and made improvements in the construction of the microscope Not only was Galileo one of the main founders of modern science by virtue of his discoveries, but also by virtue of his methods. Rejecting the authority of Aristotle, he observed things for himself and based his deductions on actual tests and mathematical analyses. This is the true spirit of all modern experimental science.

GALSWORTHY, John (1867-1933). When he was at Harrow preparing for eollege, John Galsworthy was captain of his football team. It is doubtful then whether he had any idea that some day he would be a famed writer. He was probably worried about goals, not novels.

Galsworthy was the son of a successful attorney. He was born at Kingston, Surrey, in England, on Aug. 14,

1867, and grew up not far from London. At school he was not an especially good student. He attended New College, Oxford, and was described as "lazy, dressy, and sporting." But later he took honors in his law studies and became a member of the bar.

He did not work at his law practise; instead he traveled to such places as Egypt, Fiji, Australia, and America. On one trip he met a ship's officer who shyly showed him a half-

finished novel. The officer later became famous as Joseph Conrad; and the two became lifelong friends.

Back in England, Galsworthy settled down to write. He published four novels under the pseudonym of "John Sinjohn." The stories were weak, but they were good practise for him. In 'Man of Property' (1903) he showed his first real greatness. The story grew into a series of three novels, now called 'The Forsyte Saga'. It deals with Soames Forsyte, who thinks of his wife as a piece of property. In these books, Galsworthy eritieizes the selfishness of the English

property-owning elass. He shows the people of this class as being more interested in property than in human beings. Three later novels about the Forsytes were published as 'A Modern Comedy.'

Galsworthy also won fame as a serious playwright. 'Strife,' 'Justice,' and 'Loyalties' are his best-known plays. In 1932 he was awarded the Nobel prize for literature.

GALVANOMETER. On the dashboard of every automobile is an instrument that tells when and how much the battery of the car is charging or discharging. This is an ammeter and, like the voltmeter and wattmeter, it is a member of the galvanometer family.

Most of these instruments for use with direct eurrent are built on the D'Arsonval principle. A small coil of fine wire is pivoted between the poles of a permanent magnet. Two small springs hold this coil in a neutral position and also serve to carry eurrent to it. When current passes through the coil the latter becomes an electromagnet (see Magnet), whose north and south poles are repelled by the adjoining poles

> of the permanent magnet (as shown the picture), then attracted by the opposite poles, if the coil is moved far enough. This causes the coil to turn on its pivots against the pull of the springs. The degree of this movement, usually indicated by a pointer and scale, is a measure of the eurrent.

The ordinary ammeter is a galvanometer eonneeted in series with the circuit to be through a strip of

measured. Most of the current passes metal called a shunt, but the small part that goes through the resistance offered by the moving coil is always a proportional measure of the main current. The voltmeter is a galvanometer of very high resist-

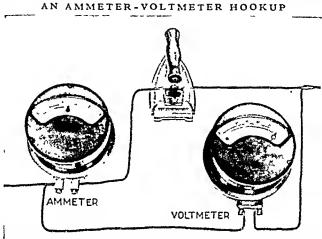
portional to the voltage. For use with alternating current, the permanent magnet may be replaced by a fixed coil which takes eurrent from the same circuit as the moving coil.

ance. It is connected across (in parallel with) the

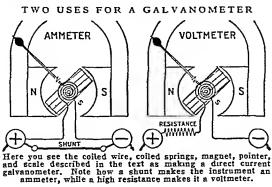
circuit so that the current it allows to pass is pro-

Since the polarity of the fixed eoil alternates at the same instant as that of the moving coil, the direction of the magnetic action remains constant. A cheaper instrument consists of a fixed eoil which draws a light iron core inward regardless of the direction of the current. In the "hot-wire" ammeter the expansion of a fine wire as the current heats it moves a pointer over a scale.

In a wattmeter a fixed coil is connected to the



Here is the correct way to test the voltage and amperage of current taken by an electric iron. The current flows through the ammeter (series connec-tion) and the iron. The voltmeter is connected in parallel.



GALLESTON'S DEEP AND SHELTERED HARBOR



in to jett on at the backer entren a malitie in the 35 foot channel for the barbe

circuit in series and a moving coil in parallel. The resultant movement of the needle depends on both the amperage and the voltage thus giving a reading in watts GALVESTON, Tax. In 1900 the city

of Galveston suffered one of the worst disasters in American history On September 8 a West Ind an hurricans blowing 120 miles an hour struck the cut of the worst of the worst

But Gaiveston refused to yield to the ocean The people ima edi ately began building a giontic coa crete sea wall fronting the Gulf for 7½ miles They put houses on stilts and elevated car lines. Then they raised the entre city 17 feet by pumping in almost 20 mill on exible

youls of sand from the ocean bed Today Galactonisone I the world's

great ports. Standing on Galveston Island it has a deep natural harbor Versels appared the harbor through three miles of gran to get the which mantian a 20-foot depth in the channel Muse upally owned docks prori is more than 3.5 pers for loading and unlouding shape. Each year Galveston exports large quantities of crude sulphus cotton flour and when Incompany evensels bring exposed bandans and sugar. Other industries in the ety in club flour and in rice mill shorms fisherse and day

docks for shybuilding and repair. The rebuilding and elevation of the city brought better faranage and improved health cond toos. Gall vaction is now a finnous seak de resert stratung more than a milion was tore every year. If from more than a milion was tore every year. If the more than a milion was tore every year. If the more than a milion was tore every year and the more more about the mostle of the m

ewholts hall a stadium and an anal terum. The city is located on the ensistent end of Gala-exton. Island which is 30 miles long and two m les wide. It is econnected to the Treas manifold by a two of keep cortes causeway constructed 125 feet above the Gulf Another causeway care est the taffic of five a far and laws. A large a sfield built by the sumy day my the second World War is used as the municipal's ripet.

Galveston was named for Count Bernard ads Galver, Spanish veropy of Meruce who therefor exploration of the bay in 1786. From here Jean Lafifte sailed his purise ships between 1817 and 1821. It between was in corporated by the Repul I c of Texas in 1839. During the Cryst War the port was blockaded and taken by Union naval versels then won by the Confederated in a letter battle Jan 1 1863. The comins can form of government was adopted in Galveston after the 1000 hurraces it proved to be as stacesful that it! as been as lely copied (see Municipal Government).
The city is one of the South a largest medical
enters maintaining five hospitals. The University of
Texas, We heal School is located here. Population

(1940 census) 65 598. GAM4 (c. s. s.) Vasco DA (14107 1521) For more than 09 years Portoques explorers had here respenged down the act coatt of Africa trying to find a youte of the coatt of the coatt

To Da Gama was entrusted a fleet of four small vessels. It shrother Paulo was piaced in command of one of them. On July 8 1497 they ect sail from Lasbon Da Gama was determened to round the Cape of Good Hype which Duay had called the Cape of Storms and cross the Julyan Ocean.

There was good reason why seamen before Dux and Da Gams had fasted to find an eastward passage to India One was an old superations at Il believed by many that no man could have nequatorial heat Another was that along the whole west coast of Africa there were few males where shore could put in to role out storms and to Ell their water casks on the long vorya. But the worst deterrents were the dol drums and the southeast trade winds (see Windo). The first byte venely becamed in equatorial waters for a long period. If they finally traversed the dol drums the steady southeast trades blew directly

ROUNDING THE CAPE OF GOOD HOPE



proud moment for Vasco da Gama came when he gazed at the long-sought Cape of Good Hope. This picture is from a mural by J. H. Amshewitz in the South Africa House, London.

against their track. Then too they feared they would have to fight the northeast trades on their return.

But Da Gama ignored all dangers. From the Cape Verde Islands he set a course through the South Atlantic that carried him within 600 to 800 miles off the bulge of Brazil. It took four months of battling head winds and currents to pass the Cape of Good Hope. Here the crew, weary of months at sea, begged him to turn back. Da Gama refused; and the crew threatened mutiny. He then pretended to agree, saying that they must have a document listing reasons for turning back to present to the king. As three lead-

ing seamen came into his cabin to sign the document. he had them clapped in irons. Then he ordered the master and the pilot to hand over their navigation instruments, threatening to execute the seamen if they refused.

Da Gama threw the navigation instruments into the sea. He told the crew that God would be their navigator and that they must go on. He finished his speech coldly with the words, "Henceforth let no one speak to me of putting back, for know from me a certainty, that if I do not find information of what I have come to seek, then to Portugal I do not return."

It took Da Gama another four months to sail up the east coast of Africa. He reached Malindi, in what is now Kenya, in April. There he met Indian traders who gave him a pilot for the rest of the voyage. In May 1498 he landed at Calicut on the west coast of India. His reception by the ruler of the city was not at all friendly, but he saw enough to convince himself of the immense wealth of the country before he began his homeward journey.

Scurvy had killed 115 out of his crew of 170. When the 55 survivors arrived in Lisbon in September 1499. however, they were given a splendid reception. Vasco da Gama was granted the coveted title dom. His pensions and facilities for trade with the Indies made him one of the richest men in the kingdom.

In February 1502 Da Gama set sail a second time for India. He returned in September 1503 with the first tribute of gold from the East. Again money and honors were heaped upon him. Unlike Columbus, Da Gama enjoyed favor as an adviser to the king and was made count of Vidigueira in 1519. Five years later he was sent as viceroy to India. Old as he was, he set out to reform abuses in the colonial government, but he died within a few months.

His voyage had brought his country immense wealth. As a result of his exploration Portugal had become one of the foremost powers of Europe, because it controlled the route to the Indies. As Columbus opened the way to the West and its ultimate wealth, so Da Gama, in the same decade, opened the way to the East and its immediate riches.

### GAMES New and Old for PLAYERS of All AGES

AMES. It is difficult, if not impossible, to trace the origins and originators of games from the obscure past. They are as old as civilization itself. In every part of the world, games have been a real force in the growth of our culture. They have sprung from events in the lives of people-some tragic, some happy and commonplace. Many games are outgrowths of religious ceremonials and rituals; some are from the preparation for and waging of war. Still others are the result of mythology, folk customs, social habits, politics, or commerce. The young and the old can be found playing games anywhere in the world today-just as they have always done.

Though the situation which first brought a game into being may be lost with the passing of time, the

game pattern itself often survives. It may be known by different names in various lands at different times. Hopscotch, Blind Man's Buff, and Tug-of-War were as popular among the children of ancient Rome as they are in schoolyards and back yards today. In the time of the Roman Empire, Blind Man's Buff was called Murinda. The German youngster calls this same game Blind Cow while the little Spaniard thinks of it as Blind Hen and the London child may know it as Hoodman Blind. Running, jumping, throwing, swinging, as well as many forms of ball and kite-flying games, are standard among games of many lands. Importance of Games

Games could not have survived so many centuries if they were not important, even essential, in the lives

of people The desire to play is universal an I per sonally satisfying Playing games is one of the many ways of giving vent to the need for self expression and of providing release from the tensions of reality Games stimulate the whole person and contribute richly to people's physical mental and sometimes spiritual development (see Play) When the rules of the game are observed as they should be the social values of the game are incomparable. The game provides a common meeting ground for groups enabling each participant to better understand himself and others The spirit of the game especially a team game-calls for the co operation sharing and compromise nee led in everyday life. Thus it is clear that g times can be a may of opening new roads of appreciation understanding and learning. While playing games is an effective way of developing ones will and determination to force ahead games can also be invaluable in teaching restraint and self control

Kinds of Cames Some games are simple calling for little skill and preparation while other games are highly organized and require full-dress arrangements; including special equipment facilities and training. Many games are competitive They may require strength persistence or skill. Some are creative and expressive in nature All give the player some degree of satisfaction

There are games for the home the back yard and the neighborhood. These and other games are played on the playground at the nark or at the community center Get acquainted games or icebreakers are popular among folk who may not know each other well bome games are active and others quiet There are nonsense games and stunts as well as countless musical games. Games can be found which one individual can play alone Most require two or more persons or a small group. In a few almost any number of persons who are within hearing ! tance can play together Games have been designed for chil iren of dif ferent ages and for adults Games for small el aldren do not require the element of compet tion The young



This small boy is proud to join his older brother on the game the generations before him empyed playing Chi-of med eval Europe played this ancient musical geme

sters get pleasure from dramatic play—acting out sim ple stories or im tating common things. Singing games have gn en joy to chil Iren through the centuries. They at! n tie rhythm c and social development of the young In ad I t on to the multitude of games requir ng no special equipment the stores offer thousands of board games card games and other special games Son e of the commercial games such as Parcheeu are as old an ! as widely belove ! as the folk games. Yet fresh novelt es take the public fancy every year



child and so on a



Games are successful when they are understood and when they are enjoyed. They are worth the time it takes to learn them. Games can and should be taught easily and quickly. Here are points to keep in mind:

1. Games should be carefully selected with respect to age and sex interests as well as to the conditions under which they are to be played.

2. Supplies or equipment required for the game should be prepared beforehand.

3. Game directions and rules should be given elearly, simply, and briefly.

4. If formations are required for the game, they should be illustrated or demonstrated.

5. The game should be started with a minimum of suggestions, and the players' questions answered as the game continues.

6. The game should be discontinued before and not

after the player has lost interest in it.

Rules are given here for types of games which have proved to be popular with various age groups and which can be informally played with little or no equipment. The active games are those requiring running or other fairly strenuous exercise. The quiet games are quiet in the sense that no running about is required. They may be very noisy. The grade level at which each is popularly played is indicated.

#### Instructions for Active Games

Bull in the Ring (Primary)—One person is chosen as the bull. The players form a ring around the bull, holding hands. The bull tries to break through the circle. He may rush, lunge, or pull to try to break the ring. If he breaks through and escapes, the players chase him. Whoever catches the bull takes his place. The bull may not duck under the chain of arms.

Cat and Rat (Primary)—The players hold hands and form a circle. One player is chosen as rat and he stands inside the circle. Another player outside the circle is selected to be the cat. The cat tries to catch the rat. Players help the rat and hinder the cat by raising or lowering their arms and by trying to prevent the eat from breaking through the ring. Several persons can serve as cats and an equal number as rats for variations.

Clap in, Clap out (Intermediate)—Teams are chosen and line up at opposing ends of a playing space, 30 to 50 feet apart. One team sends a tapper to the opposing side. The players on this side stand with both feet back of their line with one hand outstretched, palm up. The tapper walks along this line. He taps each hand, in turn, until he decides which player he wants to chase him. When he decides he quickly slaps this person's hand hard. The tapper then runs quickly to his own line. If he arrives before the chaser can tag him he is safe. If not, he joins the opposing side. The tapper may feint at hitting a hand hard and then hit it gently in order to fool his opponents.

Flying Dutchman (Primary)—The players form a ring by couples. Couples then hold hands. One couple stands outside the circle. Joining hands they start around the circle. Soon, and as a surprise, they slap the hands of a couple in the circle and continue around

BUILDING MUSCLES WITH DODGE BALL



The children around the circle try to hit the feet of the three in the center with the ball. If a "dodger" is hit he exchanges places with the one who struck him.

the circle in the same direction. The couple slapped starts running immediately in the opposite direction continuing to hold hands as they run. When the couples going in opposite directions meet it requires quick thinking to avoid a collision. The first couple back to the open position in the circle remains in it. The pair that arrived too late continues the game.

Guarding the Treasure (Intermediate and Junior High)—Use a volleyball, or play ball, or tin can. This treasure is guarded by one player who is "it." He is the defender. The others are the enemy. The defender stands directly over the ball, or treasure. One foot is placed on each side of it. The defender can stand directly back of the treasure or he can maneuver around it. The other players eirele about attempting to get the treasure by kicking it away from the defender without being tagged by him. If the defender tags any player before another kicks the treasure, the tagged player then becomes the defender. If an enemy succeeds, another player immediately kieks it, and all the enemy pursues the ball, kicking it. The enemy tries to prevent the defender from regaining it and standing guard over it as before. The defender alone may touch the treasure with his hands.

Ocean Wave (Intermediate, Junior, and Senior High)—The players sit in a circle. One chair is vacant. A player stands in the center of the circle. He shouts, "Slide left!" or "Slide right!" At these commands the seated players move to the left (or the right, as called) to fill the vacant chair next to them. "It" tries to occupy the vacant seat and continues until he gets it. The location of the vacant seat changes constantly as the players move into it when "it" comes next to them. When "it" gets a scat



for Hopicotch, Shuffleboard and other court genes have been provided The Pou Athletic League of New York City equips and supervises such slaygrounds

and the call has been Slide left the player to it a right becomes it

Philsring Sticks (Intermediate and Junior II gh)— Drude players evenly into to vo des Home bears et des gnated by drawing or selecting custing lines at each side and from 20 to 0.6 feet apart. To the rear and in the center of each base line is the prison five feet wide and about three feet deep. In front of the prison and three feet in front of the bose line is a sone in which four st cles are obtained.

One side sends out a player to due his opponents. When one of the opponing side starts after him he runs for home. If he runer is tagged before he can return home he is safe. If the runer is tagged before he can return home he becomes a prisoner and goes to the prival. If a player tag an opponent this making has privater this making has privated for a runner from it er is de tags the Privates can be reliesed if a runner from it er is de tags there. Privates must keep one foot in private but may stretch out their hands to be tagged.

When a player gets to his opponents goal where the sticks are placed he p clas one of them up and taken it back to his our teams goal. He may return safely to his home base. When players are in prival the st cks cunnot be taken until the prisoners are released. The first side to secure all the sticks from the opposing oide wins the game.

Pom Pom Pullaway (intermediate and Junior High)—Mark lines 30 to 50 feet spart. Curbs trees or other markers may be used for the lines. All players stand on or behind a line. A player chosen as at stands in the center of the playing area and shouts.

Pom Pom Pullaway!
If you don't come I il pull you away

Upon I ear ng th a all the players leave the safety zone and run across to it e apposite line. It tres to tag as many as poss ble before they reach the safety line. When tagged the players join it in catching other players as they dash across the open space. The game ends when all are caught.

Run, Sheep Run (Intermedials)—Choose to equal side Each adeselved a captain A home base in selected One group is the sheep They feave and hade. Their captain comes back when if ey are ready and accommanse the upone grade as it hunts for the sheep. When the cap to a thinks the time appropriate he had to a think the time appropriate he had to be a support of the sheep. They for home base under attely 80 do the states. If the sheep back the seekers to home base they hade again front the seekera become sheep in the first of the seekera become sheep in the grade of the seekera become sheep in the grade of the seekera become sheep in turn.

Shoulder Tap (Intermediate)— The players ared vide linto groups of five to eight and arranged as in

spokes of a wheel with the player face up the center or hub There is one exter player who is it. If goes around the eurole and taps one of the end men to the back. The end man taps the person in front of 1m and so the top is passed until the player at the lube end is the lead is. If my and at this signal sill players in this thore can second the crebe to the rightly into the rough players and try to get back quickly into the rough all posts and try to get back quickly into the rough all posts one of the player left without a place is if for the next game. Players many not start to my the before the signal. Hy in solled

Sped (slanor and Sensor H. L. We a charter that Sped (slanor and Sensor H. L. We a charter that the same time calls the name of a player That player recovers the ball while all other players existive an fast as they can. He trees from the point of recovery to that another player with the ball can as counts one spud aga not the player who m sees Alter messing the thrower must recover the ball and throw again until fie hits another player and throw again until fie hits another player. The spud sputs him out When a player is h the recovers the ball and attempts to hit someone else II a player gets three spuds against him he bends over against a wall and all the other players have the fun of taking one shot at him with the hall

Singeocach (Intermediate)—Players are seated in a curie Each player takes the name of some part of a stageonach—wheel wie seat re us harness brake horses driver baggage and the like One per son as chosen to tell a story about a stageocach and in telling at hongs in all the different things related to the stageonach has each item is mentioned the player representing it gets up and runs around his

chair. At some point in the story the storyteller yells, "Stagecoach!" When he does, everyone must leave his seat and scramble for a different one. The storyteller attempts to locate a seat during the change. The player not finding a seat begins a new story. This game may be played as "Automobile," with players taking the names of parts of a car.

Statues, or Red Light (Primary)

—The players form a line. One player is chosen as "it" and he stands some distance ahead of the line. He covers his eyes as he counts from one to ten. The players try to go from one side of the room or area to the other while "it" counts to ten. When "it" has counted to ten he looks up suddenly. Any player caught in motion must go back to his starting place. The other players hold whatever position they may happen to have at the time, statuelike. The first player to cross the room is "it" for the next game.

Three Deep (Primary)—The players stand in a circle two deep, facing the center of it. Two players on the outside of the circle and at a good distance from one another begin the game as runner and chaser. The runner saves himself from being tagged by stepping in front of one of the pairs of players, thus making the circle at that point three deep. The outside player in the three-deep row leaves immediately or is tagged. When a player is tagged he becomes the chaser. A runner may run in any direction he chooses, to the right or left or across the circle. He may not leave the general area of the circle. The runner can step only in front of a player and make the circle three deep by moving from the outside into the circle and to the right.

#### Rules for Quiet Games

Battleship (Junior and Senior High and Adults)—This game can be played by two individuals or two groups. Each player or team has three charts: No. 1 to record the enemy's shots on his ships, No. 2 to record shots at the enemy's ships, and No. 3 to record successful shots, or hits (see diagram).

Each player or team secretly locates his ships in the first chart using four consecutive spaces for a battleship, three consecutive spaces for a cruiser, and two consecutive spaces for each of his submarines. (If the charts are enlarged, the number of spaces increases, the number of ships, and hence the number of shots allowed, also increase.) Ships may be located on the chart vertically, horizontally, or diagonally. Opposing players or teams do not know where the opponents have placed the ships.

Each player or team at the start shoots a volley of seven shots at the enemy's ships. Three shots are allowed for the battleship, two for the cruiser, and one cach for the submarines. For example, the first

CHARTS FOR KEEPING SCORE IN BATTLESHIP 4567 8 9 10 3 4 5 678910 В C D D 2 Ε E 2 2 F đ G 2 2 2 H Н 1 1 2 No. 1 No.2

Each player in Battleship has three charts like these. On Chart No. 1, Player X places his battleship (using four spaces); cruiser (three spaces); and two submarines (two spaces each). He uses Chart No. 1 to spot the shots in each enemy volley. He locates his own shots at his enemy's ships on Chart No. 2, by number of volley. When Player Y reports that X has hit one of his ships, X records the hits on Chart No. 3. Player Y marks his charts by the same rules.

player or team calls his shots as follows: "I am shooting at A1, B2, C3, D4, E6, F9, and G10." As he shoots he records his shots, by volley, on the second chart using the figure "1"—meaning the first volley. Simultaneously, the opponent marks a "1" in each place called by the first player, on the chart where his ships are located (his own No. 1 chart). After each volley, the player whose ships were being attacked tells the opponent how many hits he has scored and on what type of ship. The location of the ships, however, is not revealed. He need say no more than, "You hit my battleship twice and sank a submarine." Truthful answers must be given. His opponent records this information on Chart No. 3.

Then the second player shoots a volley of shots at his opponent in the same manner. On the second, third, and fourth volleys, the figures "2," "3," "4," are used to record the shots. A close study of the shots helps the shooter to locate the enemy's ships. If the battleship, for example, has a "1" and "3" volley shot on it, he looks for a "1" and "3" sequence on his chart for a clue as to where to place his next shots. When a ship is sunk, the player or team losing the ship also loses the number of shots he was allotted for that particular type of ship in the beginning. A player losing his cruiser, for example, will be reduced to a total of five shots on the next volley. A player is defeated only after all his fleet is sunk.

Button, Button, Who's Got the Button? (Primary)
—The players are scated in a circle with one player
in the center. In the circle is a button which the
players try to pass back and forth undetected. They
keep their hands in motion constantly as if they are
receiving or passing the button. The center player
tries to guess who has the button. The player caught
with the button takes his place.

Fisherman (Primary and Intermediate)—The players sit around a table or on the floor. One player

13 chosen to be the fishermon He is given a chart stick (fishing note) to which a piece of string is attached the string being tied at the end in a loop. The fisher man drops his line in such a way that the loop less on the table near center (Be sure that the loop trabtens easily when the string is pulled ) When the fisher man sits. Whose fish? all the players put the tips of their forelingers on the tible made the circle formed by the string Oackly the fisherman calls

My fish! and pulls in his line All places try to withdraw their fingers I efore they are caught in the loop The fisherman must sull in his line serv quickly in order to make a catch. Last player aught becomes the fisherman

Ha-Ha (Primar) and Intermed ate)-The players acting circle. The first placer starts by saving. Ha The second place was Ha Ha The third ways Ha Ha Ha And so it goes aroun I the engle while each player adds another. Ha The Has must

always be pronounced solemnly without any trace of a smile If the player laughs or smiles he is out of the game Soon the room is filled with laughter I Like (Intermed ate and Above)-The leader says

I don't I ke tes but I I ke coffee It goes from player to player each saying I don't like tea but If a player calls any word which does not have a double letter in it the leader says. No I don't like that I lke apples but I don't like I like books but I don't like pencils pests. Therefore I don't like snything without double

letters in it The players will gradually see the noint. Nature Hunting (Intermediate and Above)-Players in turn say Guess of what tree I am think Guess what bird Guess what flower?

Gues, what insect Guess what river what moun-Hints may be given to help the group locate the nact cular subject. The person may say for example The meet I am thinking of likes honey an I can stine The player who guesses cor

roctly gets a change to mak a subject Palmistry Fine (Junior H an and Above)-Each player holds his left hand flat on a piece of raper and outlines it with a pencil The back of the paper is marked in some see cial nav so that it can be identified later Papers are gathered shuffled and then dustributed Fach player writes the description of a person who m ght have such a hand Papers are shown and identified and the owner of a hand must stand wille the

descript on is read aloud to the group Sardines (Junior High an l'Above) -One person is it and bytes from the other players. The players scatter and hunt it each player bunting alone As a player finds it he hides with him. He is careful how ever not to reveal the hi ling place to the others If he sees others near at the time he may go on as if st ll seeking and come back at a favorable apportunity 45 they discover where it is hid ng each player crowds in to the same hiding place. The bunt continues until all the players and

the h ding place Spell Down (Intermed ate and Above) -The players form a circle One player starts a word by stat ng the first letter The next player adds a letter He may or may not be thinking of another word must have at least three letters in them The player who completes a word must unitate a goal. Any player may challenge the one who precedes him if he questions that the player has a word in mind If he has a legiti-





written on the tag each wears. The

mate word in mind the challenger becomes a goat. If he has not, the challenged player is a goat. When a player once becomes a goat he must "baa-aa-aa" each time his turn comes

instead of adding a letter.

Twenty Questions (Junior High and Above)-A player leaves the room. The others select an article or object. When the player returns, he tries to discover by questioning what it is. He is allowed 20 questions. He might first try to locate it. "Is it in this room?" "Is it in this state?" When he locates it he may try to find out something of its nature. "Is it human?" "Is it inanimate?" When he thinks he knows what it is he names it. If he is correct another player leaves the room and the game continues. If he is wrong he asks more questions until he has used 20.

Very, Very Tall (Primary)-One player closes his eyes. The other says, "I am very, very tall, I am very, very small; sometimes I'm tall;

sometimes I'm small. Guess what I am now." He stands or stoops. The player with the closed eyes guesses whether the other is tall (standing) or small (stooping). He continues until he guesses correctly. Then the other player guesses. If the game is played by a group, "it" stands in the center. The whole circle stands or stoops. If "it" guesses correctly he chooses someone to take his place.

Wheel of Fortune (Intermediate and Above)-A wheel is drawn on paper. Between the spokes, numbers are written, one number for each space—one, two, three, five, eight, ten, and the like. Each player, in turn, takes a pencil or piece of chalk, twirls it in

the air saying:

"Tit for tat. Butter for fat. If you pet my dog, I'll pet your cat.'

At the word "cat," the player lets the pencil fall on the wheel. The number written in the space where the pencil point lies is the score. If the point lies on a line or outside the circle, nothing is scored. Each player takes his turn. Any number of points over 35

may be considered a game.

Who Am I? (Intermediate and Above)—"Who am I," asks one of the players. Other players ask such questions as "Are you dead?" "Alive?" "Are you a man?" "Are you a political figure?" "Are you fictional?" "Are you married?" and so on. Finally some player guesses the name of the person. The player who guesses correctly calls out, "Who am I?" and the game continues. Historic figures, characters in fiction or in the theater, or present-day persons may be used.

Who Is Knocking? (Intermediate and Junior High) -One player sits on a stool in front of the group. He

DOMINOES, A HOME GAME FOR ANY AGE



These children are enjoying Dominoes, an old favorite among the many commercial board and table games. To start, all players have seven "pieces," which they play in turn by matching the "spots." They fill their hands by drawing from the "boneyard."

closes his eyes tightly and holds his hands over them. Another player in the group knocks on the floor behind him.

"Who is knocking at my door?" he calls.

"It is I," the player who knocked answers, disguising his voice.

The player on the stool tries to guess who knocked. He gets three guesses. If he guesses correctly, the two players exchange places and another knocker is chosen.

**Books** about Games

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Gandhi's life was filled with contradictions. He was one of the gentlest of men, a devout and almost mystical Hindu. But he had an iron corc of determination and nothing could change his convictions. This combination of traits made him leader of India. Some called him a master politician. Others believed him a saint. To millions of Hindus he was their beloved Mahatma (Great Soul).

Gandhi was born Oct 2, 1869 in Porhandar near Bombay His family belonged to the Hindu marchant caste (Vaisva), and his father had been prime minister of several small native states. He was betruthed at the are of seven and married when only thirteen

When the boy was only 19 he defied caste restractions by going abroad to study. As a law student at University College in London he was snubbed because he was an Indian Instead of becoming embittered, he turned his lonely hours to studying philosophy In cluded in his reading were such doctrines as Tolstov's belief in nonresistance. Thoreau a practise of civil disobedience," and Ruskin's urge to forsake industrialism for agrarian life These fitted in excellently with many Indian religious ideas

In 1891 Gandhi was admitted to the bar, but returned at once to India Unsucceesful in Benebay he went to South Africa in 1893 At Natal he broke precedent by being the first colored lawyer admitted to the supreme court. He then built a large practise

But his interest econ turned to the phicht of fel low Indians who had come to South Africa as inden tured laborers. He had even how they were treated as "Inferiors" in India in England and now in South

Africa In 1894 he founded the Natal Indian Congress to agitate for Indian rights

Still he remained loyal to the British Empire In 1899 during the Boer War he raised an ambulance corps and served the South African government Again. early in 1906 he

gave aid against the Zulu revolt Both times he received medale of honor Later in 1906

however, Gandhi began his peaceful "revolution," declaring he would go to jail or even die before obeying an anti Asiatic law Thousands of Indians joined him in this 'civil dis obedience ' campaign and twice he was imprisoned Yet in the first World War he again organized an ambulance corps for

the British before returning home to India in 1914 Gandhi's writings and devout life drew masses of Indians At last they had found a leader who believed in their human and spiritual worth Almost blindly they followed him in his campaign for swarzy (home

He worked to reconcile all classes and relagious seets, especially Hindus and Moslems. In an etfort to smash barriers against Untouchables, he brought many to live in his mud walled village

In 1919 he became a leader in the newly formed Indian National Courses. In 1920 he launched a noncooncration campaign against Britain, proper Indiana to som their own cotton and to boycott British goods. courts and government. This led to imprisonment (1923-24) In 1930 in protest of a salt tax Gandhi led thousands of Indians on a 200-mile march to the ses to make their own salt. Again he was railed In 1934 he retired as head of the Indian National

Congress but remained its actual leader. Gradually he became convinced that India would receive no real freedom as long as it remained in the British Empire Early in the second World War he demanded immediste independence as India's price for aiding Britain in the war Again he was imprisoned (1942-44)

Gandhi e victory came in 1947 when India won independence But like his life victory was a contradiction Independence split India in two and brought fierce Hindu Moslem nots Again Gandhi turned to nonviolence fasting until Delhi rioters pledged peace to hum It seemed to the world that only Gandhi, who had brought freedom to India, could home it peace But on Jan 30 1948, while on his way to prever Gandhi was killed by a Bindu who had been maddened by the Mahatma a efforts to recon cite Hindus and Moslems (See also India) GANGES (pan gez) RIVER Born in northern India

in an see cave beneath the Himalayan enows, the Ganges the sacred river of the Hindue breaks through the last mountain barner just above ancient Hardwar A shallow, rapidly failing

stream before it gains the flow of its many tributanes. the river keeps to a southeasterly course through the land of the little, talkative

> Jats, busy in gram (chick pea) and in digo fields to Cawn pore, that blackest spot on the Indian conscience For here on a flight of steps Massacre Chat leading down to the Ganges 600 women and children were killed during the Indian Mutiny of



its journey through

the most densely populated region of the world is done. the Ganges is joined by a sister stream, the Jumna Their dosb (land between two rivers) is irrigated by two elaborate and costly canal systems led from the Ganges Allahabad on the point of land thrust out into their united swirling waters, is a holy of holies to the Hindus, the true place of pilgrimage, where the festival known as the "Maghmela" is held. Here the river becomes deep enough to bear all sorts of small native craft and it is navigable throughout the remainder of its 1,550-mile journey to its mouths on the Bay of Bengal.

In a great circle the powerful stream sweeps past Benares. The banks are crowded with temples, whose ghats (steps) creep with pilgrims of every caste and rank, struggling to wash away their sins in "Mother Gunga," to cast the ashes of their dead into its current, or to capture a small vial of its purifying liquid to carry back to distant homes.

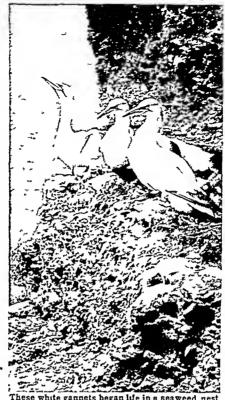
Swelling with the force of new tributaries, it flows past village and city until it meets the powerful Brahmaputra, whose black load of silt assists in the unceasing building up of its extensive delta. This delta begins more than 200 miles from the Bay of Bengal, and the river stretches myriad fingers of tiger-infested crocodile swamps southward to the sea.

Chief of its channels is the Hooghly on the west, bearing majestic ocean liners 80 miles to busy Calcutta. Here the stream is choked with narrow native canoes with tiny deckhouses and fat barges topped by bamboo cottages, unloading the plentiful output of India's plains. Constant dredging is needed to keep the channel free of silt.

India worships "Mother Gunga," just as ancient Egypt deified the Nile, because it gives life to the millions that swarm the 390,000 square miles of its fertile basin. When the summer rains beat down, every

tributary of the Ganges rolls in a flood down to the holy river. The muddy waters creep across the broad flood plain, mile upon mile, deepening to 60 feet in places. When the rains have spent their force, the deluge recedes, leaving a new layer of rich soil on millions of tiny farms. Rice, wheat, cotton, jute, spices, and other crops spring from the

BORN TO SKIM THE SEAS



These white gannets began life in a seaweed nest on a precipice such as this one. Destined to roam the seas, they know no other home than the bleak rocky ledges above the roaring surf.

soft, warm loam, feeding almost as many people as live in both North and South America, and sending rich exports around the world.

GANNET. While the snow still clings to the cliffs of Bird Rock and Bonaventure Island in the Gulf of St. Lawrence, large sea birds come in flocks to build their nests on the wind-swept ledges. They are gannets (Moris bassana), with pure white plumage and black wing feathers. measuring about 35 inches in length. This species, which also nests on several islets off the coast of the British Isles, is the only northern representative of the gannet and booby family Sulidae, the remaining ten species being distributed over tropical and subtropical coasts.

Gannets and boobies are sea dwellers and fishermen. The white-bellied booby (Sula leucogaster), found on the Bahaman Keys in large colonies, and the red-footed booby sometimes visit the Florida coast.

GAN'YMEDE. According to a Greek myth, this beautiful youth, the son of King Tros, attracted the notice of Zeus, king

of the gods, who determined to make him his cupbearer to succeed the goddess Hebe, and so sent his eagle to carry him off to heaven. Zeus gave Tros a pair of divine horses and comforted him by telling him that his son was now immortal. Ganymede was a favorite subject of ancient art.

GAR. This name is given to two unrelated families of fish—the fresh-water gar pikes of North America and the marine gar fishes. All of them are large fish and have jaws prolonged to form a lengthy beak armed with sharp teeth.



This great alligator gar from Moon Lake, Miss., is about ten feet long. Notice the long snout with two rows of sharp teeth. These medible fish do great damage to the commercial fishing industry.

FRAGRANT BEAUTIES OF THE SOUTH

Gar pikes are survi vors of a primitive order (Holostes) once abundant in European waters. They are now confined to Central America and North America in the Atlanticand Gulf coastal rivers the Great Lakes and rivers and lakes of the Mississim Valley.

They have slender ev Indrical bodies covered with diamond shaped ganoid scales-that is scales composed of hone and an outer laver of en amel Because of the armor plate no other fish attacks them Be fore the days of the steel plow the horny sk n was used to cover ploy shares It is still used to a small extent as a covering for novelty boxes Gars are seldom used for food Fisher men kill them because they are highly destruc tive to other fishes They are solitary feed ers Drifting near the surface of the water they look like a piece of boow

The long nose gar or billfish (Lepisosteus osse-

ue) is the most abundant. It grows to be 4 or 5 feet long. The short home gar (L. platostomus) and the spotted gar (L. productus) are smaller usually 2 or 3 feet long. The alligator gar (L. spotsids) is one of the largest fresh water fish in North America. Because of its great size (8 to 10 feet long) it causes considerable

damage to fish ng nets and gear

The manne gars (also called needlefishes) are from
4 to 6 feet long. They are greensh fishes with a lyer

Internating gars, tauto caused necessariasses and as lever scales. They are exhibe but are unpopular as food fishes because the bones even when cooked are a bright green. These gars are plentful along sandy shores of the Atluntic and Gulf coarts where they feed in large shoals on other fish. Si her gars (Shong)pur marriago are found from Coope Cod to Texas.

GARDENIA The shrubs and trees known as gar denas are prized for their fragrant wardke flowers of white or yellow The axty or more species are all bative to warm parts of the Old World notably China India and South Africa Long ago several spec es were introduced into Europe and America

The most widely cultivated spec es is the Cape pasmine not to be confused with the true jasmine (see



heavity on futned wary whate go den as grow in the warming one of the South as far now V gink. They are often planted on hedges. Apolba mame for them is Cape Jashina.

Jasmine) It is not ve to China but it was introduced into Cape Colony and from there brought to England and the United States.

The tender shrubs two to sax feet high three only doors as Is nooth as Vurgan. They was pointed evergene leaves up to four inches long and burst min flower from May to September breathing out a sweet and heavy fragrance. The overlapping petals of wany white form a de-sheaped blossoon of delicate beauty. The bloscome range m use from two mehres for the gar three for the contract of the contract o

The greenhouse variet es are propagated from euttungs planted in early winter and kept over heat To neame large and fuzurant blooms the buds and the s de shoots are pinched off until late September Buds are then allowed to set upon the stronger shoots They bloom by early winter in time to meet the seaweal demand of cut if foorers.

Spinal territories of the above is Gardens as form the genus Gardena of the Cape income of (Rubaccae) The second for some of the Cape income of Gardena was notice The genus Gardena was named for Dr Alexander Gardan (1730\* 1791) of Charleston, 8 C who first deser but



The gay spread of flowers, the green grass, the well-placed shrubs and small trees turn a simple cottage on a vacant lot into a beautiful home of which any man might well be proud

CARDENS AND GARDENING As widespread as the soil itself is the urge to plant a garden and watch it grow. It is an urge shared by all mankind—savage and civilized, ancient and modern, poor and rich. Even the farmer who cultivates wide acres for a living will often take special pride in the patch of vegetables, the flower beds, the shrubs, and the hedges that surround his home.

For those who live in cities and suburbs, home gardening has a very practical side. The backyard patch can be made to produce vegetables of a quality and flavor far superior to those bought at the market. A plot 20 feet square and a cash expenditure of \$5

for seed and fertilizer will yield fresh vegetables approximating a value of \$50. On the other hand, a flourishing flower garden and artistically landscaped home grounds may greatly increase the value of the amateur gardener's property.

But the rewards of home gardening are much bigger than mere dollars and cents As one garden-lover says, "Your chief joy in your garden will not be in the vegetables that you eat, or in the flowers that you pick, but in the satisfaction of causing things to grow. You will enjoy the companionship of things that are real and clean. You will come to know the common and the little things. Just to have handled the new earth, and to have sown the seed, and to have thought about the garden at morning and at night—this is worth the effort. You have come nearer to nature"

### Selecting the Vegetables to Plant

The home gardener who is raising crops to be harvested within a few feet of his own door can overlook the requirements of the truck gardener, who has to select varieties that are easy to handle, transport, and store, and hence sacrifices delucacy of flavor to toughness of fiber. The small gardener should choose his crops on this basis: (1) relative popu-

larity of the vegetables; (2) ease of culture, (3) returns for space and labor, (4) table usefulness and food value of the crop Bush beans, corn, peas, tomatoes, lettuce, onions, radishes, beets, and carrots are the most important vegetables suitable for the small garden

Whether we are planning to build a vegetable or flower garden or to landscape the surroundings of the home, the initial steps in garden making are the same. The ideal garden plot is one that is open to sunlight but protected from drying and cold winds. Where possible a general slope to the south is beneficial. No green plants can live without sunlight, and with few

tions they demand actual sunlight for at least of the day Avoid placing the garden where it is econtinually shaded by buildings

e soil is the foundation of the garden On the of whether they are easy or difficult to work are roughly classed as hight or heavy Light costs in a large percentage of coarse-grained sand and herefore loose and easily worked Clay is hard fork because it is very fine grained and holds amounts of water Such a soil can be improved be addition of Sand and decayed vegetable matter

How to Prepare the Ground

fore planting the soil must be well repeded or the physical character do that the plant roots may penetrate easily the substitution of the twice and air may pass through This see the did cell reproduct the winters and air may pass through This see the followed the result of the ground in only enough to remule when it is the ground in dry enough to remule when it is the ground in dry enough to remule when it is used to provide the second of the result of the re

depth of two feet or This deep tillage of seed bed acrates the and lessens the need constant watering , after the soil has raked and made th and level are we y to start planting desiners in preparing

seed bed is one of the st common causes of tden failures Planta like children

uure a well balaneed you of food in order juye The soil is that juyed the soil is that aboard and this must well stocked to produce a best crops. There are clements in the soil cossary for plant growth at often need to be in ased. These are nutro-phosphorus and the soil method to be in the soil of the soi

arnyard manure supplies
ese foods and also adds humus or organic matter
the latter makes the soil light and loose so that the
ant roots may penetrate easily and also helps

tain the water in the soil

Standard commercial fertilizers containing about 4

r cent nitrogen 12 per cent phosphorus and 4 or 5

per ceat potassuum may be substituted if bernyard manute as not a sulable using about one pound of fetithere for every 30 square feet of land If commercial fertitheres are used as much vegetable matter as possible should be added to the garden soil every fear to manutam the supply of humus Rey planted in the fall after the crops are harvested and phowed under in the sprang will supply that vegetable matter. Lume is added to correct the soulty of the soil but arcives should not be limited unless tests show that it is needed. If beet grow well in the garden home is a supply of the physical character of some heavy soils such as they from the physical character of some heavy soils such as chay in this instance should be soil to the acre are used (See Fertilizers Soil).

It is good practive to make a rough plan of your garden on paper before planting. In arranging the different crops in the seed bed the following harts should be considered (1) Perennials that is plants that live on and continue to produce flowers fruits and seeds from year to year should be placed to one ade so that they will not interfere with the yearly plowing and cultivation of the seed bed (2) Spreading plants including melons cucumbers squashes pump-

kins and tomatoes should not be permitted to over run smaller cropa (3) Tali plants should not over shadow shorter ones

When to Plant There are two important planting times spring and full Annual vegetable and flowering plants-those that bloom and produce fruits and seeds in a single season-are usually plant ed in the spring but almost any annual which is self sowing can be seeded in the fall Annual flowers especially poppies corn flowers larkspur and even sweet peas will bloom much earlier if planted in the fall Plants that are propagated by means of bulbs such as daffodil narcissi tulips and others are planted in the fall if they are to bloom during the following spring February and March are the

months in which to plant



culptured greenery

early flowers and vegetable seeds indoors or in hot beds or cold frames Tomato seeds should be planted from eight to ten weeks before the plants are to be placed in the garden and pepper and carly cabbage social from six to eight weeks Petinia verbens, pentskenon boletis snapdragon and other flower seeds that require a long time to germinate should be planted before the end of February.

For indoor planting a warm room and a sunny window with preferably a south or east exposure are required. A shallow wooden box or tin pan with holes punched in the bottom for drainage will serve as a temporary home for the plants. The box or pan should be filled to a depth of about four inches with good garden soil. Starting plants in hotbeds or cold-frames,

if these are available, is preferable to indoor planting. Not only can a greater number of plants be sown, but such quickly maturing crops as lettuce and radishes may be raised.

#### How to Transplant

Before the seedlings are transplanted to the garden they should be kept outdoors for a few days so that they will become accustomed to their new environment. The chief rules for transplanting are: (1) Select a cloudy day. (2) Give the seedlings a thorough watering before moving them. (3) Take up each plant carefully so that its roots will be disturbed as little as possible. and place it in the hole made with a small stick or dibble. (4) Plant the seedling slightly deeper than it grew before and press the soil firmly about its roots. (5) Water each

plant thoroughly immediately after transplanting. The natural time for any kind of transplanting is in the spring because then the plants are starting new growth and their active cell formation will repair damages to the roots. Transplanting trees, shrubs. and other perennial plants in the fall, however, is practical except in very cold or dry regions. In moving a plant always remember that it is a living thing and that cutting or breaking its roots may kill it. Evergreens and most other trees and shrubs should be handled with a large ball of earth around the roots to protect them. The hole into which the new plant is to fit should be made much deeper and wider than is necessary to accommodate the plant, and the bottom should be covered with fertile top soil. Spread the roots into their natural positions, and then gradually work in rich and well pulverized soil about the plant and roots. Put in small quantities at a time and press each layer in firmly. In dry weather particularly, and always with plants having big roots, it is better to wash the soil into position with copious waterings from a hose. Fertilizer must never come in contact with the roots, so do not mix it with the soil used in transplanting.

"Plant thick and thin quick" is the colloquial expression of good garden practise. Plant vegetable and flower seeds thickly enough to give the garden the appearance of being well covered. As the plants develop, never permit them to crowd one another. Pick out the superfluous plants so that each remain-

ing individual will have plenty of room for full development. Consult the vegetable and flower charts at the end of this article for directions concerning the depth to plant various seeds, and the distance that should be left between different plants.

Annuals will give the quickest returns in the flower beds and are essential for carrying color and bloom in the garden in midsummer. But among the earliest and finest flowering plants are the hardy perennials, the permanent plants which should be a part of every garden. There are two general types of perennials: perennial shrubs with woody tree-like stems such as roses, and herblike or herbaceous perennials in which the soft pliant foliage springs directly from the roots. In



The "outdoor living-room" gains privacy if enclosed by a wall rather than a hedge. Here the tulip-bordered stone walk is set off effectively against the vine-draped garden wall.

the latter the stems and leaves are killed by frost

each fall and are replaced by new growths each spring. Herbaceous perennials are planted in the garden wherever they give the most pleasing effects. They may be planted with shrubs or intermingled with annuals in the flower bed. They are used very effectively to furnish a border fringing the side of the lawn or even surrounding it. Peony, iris, phlox, hardy chrysanthemum, aster, campanula, delphinium, day lily, lupine, gaillardia, and plantain lily are a few of the many reliable perennials that may be used in the herbaceous border.

Spring flowering shrubs, many of which also bear attractive fruit in the fall, will help to furnish the permanent garden. Plant these preferably in the background with the flower borders in front.

Landscaping the Home Grounds

The first step in beautifying the home grounds with flowers, shrubs, and trees is to work out a complete and detailed plan. To buy shrubs and flowers before working out a planting scheme would be just as foolish as attempting to build a house by shopping for doors, windows, and lumber before drawing plans for the building The purpose of home landscaping is to ereate a harmonious and beautiful setting for the house itself Trees and shrubs should not hide the house, rather they should bring out its sabent features and harmonize with its architecture. Not only in our plant arrangements should we strive for harmony, but af«o in our color schemes

Fitting the Garden to the House

In relating the garden to the home there are three arens to consider the front, the service and the pleasure area, or "pleasance" The front and back lawns serve as the groundwork of the garden picture It is generally preferable not to cut up the center of the lawn to make room for flower beds or other ornamental planting A well kept lawn is beautiful in itself. No matter how fine its architecture, the house is not complete without some carefully placed plant masses around its foundation to blend it with the landscape Low growing shrubs should be planted in front of porches and under windows Taller growing shrubs will give support to each end of the structure

The service area in the back yard should be con-

venient to the service quarters of the house and preferably screened off by shrubs or other plants to add to the garden picture The pleasure area should be designed in relation to tha living quarters of the home Draw imaginary vista lines from windows, doors, and porches to the most distant points of the available garden area, and keep these vistas free and open Draw a rough plan of the

area with the vista lines marked on it and showing any other permanent features, such as garage or stable Also lay out any necessary walks Roughly draw ovals in each of the more or less rectangular spaces thus formed This will give you a working foundation for the plantings The centers of these ovals should be kept unplanted or practically clear. Paths should be straight wherever possible. The serpentine path is an irritation, but if introduced, each bend should be justified by some interfering object, such as a tree or a flower bed Since the garden and dwelling form a picture, modern taste justifies a

permanent enclosure so as to give scale to the entire composition This enclosure may be a wall or hedge The most common hedge material is privet, but

arborvitae, white pine, spruce, blac, or other shrubs that can stand shearing are equally suitable. Hedges should be planted in a deep trench well supplied with fertilizer Each shrub should be planted deep enough so that the final branching will extend right down to the ground level Hedges are pruned slightly wider at the base than at the top so as to avoid snow damage The last pruning should be given about aix or eight weeks before frost is expected (See Hedges )

Preparing a Good Lawn

The best lawn grass is Kentucky blue grass, but it is safer for the average lawn maker to use a high quality lawn seed muxture as put up by established seed dealers Such mixtures are more than 50 per cent blue grass, with other grasses that will germinate more quickly and give a green appearance to the lawn soon after seeding The best time to seed a lawn is in late. summer or early fall but it is commonly done in the spring The soil of the lawn area needs the same preparation as the soil of the garden itself. When turning the soil, add commercial fertilizer in the pro-

portion of ten pounds to a thousand square feet Bow three to five bushels of seed to the acre, for small areas four pounds to every thousand aquare feet Roll the ground lightly

after seeding Rockeries, pools, bird baths. sun dials, and other special gar den features must be introduced with care. A combination pool and rockery usually works out well

mere pile of rocks

A rock garden should not be a adorped with a few flowers, but instead it should be a close mutation of a natural rock outcrop carefully planted with an interesting collection of rock plants It is best placed at one corner of the garden in a realistic aetting Use old weathered rocks, all of one kind The stones should be laid horizontally, not like spiked turrets projecting into the air In building a rockery, make a mound of earth and then place the rocks in position on the mound, burying about two thirds of the atone in the soil Each rock should be

used as a support for the soil, and should be slightly

tilted so that the water will drain backwards to the



### FAVORITE BIENNIALS AND PERENNIALS EASY TO RAISE FROM SEED

These are best sown in early fall when they will flower the next year; but spring sowing is satisfactory for many of them. Make a seed-bed by forking up the soil at least one foot deep; level, smooth, and scatter seeds lightly on top. Water the bed the day before sowing. Sow in a cold-frame, if possible, and shelter it from the noonday sun. If sown in the open, shade with paper until germination takes place. Transplant, that is, "prick out," when seedlings make first pair of true leaves.

Name of Flower	Height,	Color of Flower	Distance Apart, in Inches		Depth to	Month of First	Weeks
Name of Flores	Inches		Pricking Out	Permanent Planting	Sow (in.)	Flowering	Bloom
Achillea filipendulina (fernleaf yarrow)	36-42	yellow	2	15	1-16	July and Aug.	4-6
Achillea millefolium (common yarrow or milfoil)	18-24	white, pink	2	12	1~16	July and Aug.	6-8
Achillea ptarmica (the pearl or sneezewort)	18-24	white	2	12	1-16	July	all summ
Aconitum napellus (aconite or monkshood)	48	dark blue	4	18-24	1-4	July and Aug.	4-6
Althaea rosea (hollyhock)	48-54	white, rose, yellow, purple	-1	18-24	12	August	
Anemone japonica (Japanese anemone)	24	white, pink	3	18	1-4	August	6-8
Anthemis tinctoria (golden marguerite)	18-24	rellow	2	12	1-16	July	4-6
Aquilegia spp. (columbine)	18-34	white, yellow, blue	3	9~12	1-16	May and June	8-10
Arabis alpina (rockcress)	6	white	3	6	1-4	May to Sept.	4-8
Asclepias incarnata (swamp milkweed)	36	1054	4	18	1-4	July-	4
Asperula odorata (woodrufi)	12	white	2	8	1-16	June	8-10
Aster alpinus (hardy aster)	15-36	blue	3	18	1-4	September	8-10
Bellis perennis (daisy)	6–8	wbite, rose, streaked	3	8~10	1-4	Easter	8-10
Bocconia cordata (plume poppy)	36	white	2	24	1-4	July	4-8
Campanula spp. (bellflower or barebell)	6–36	blue, wbite	3	15~18	1-4	May	8-12
Centaurea spp. (cornflower or sweet sultan).	18-24	yellow, white, purple	4	6-12	1-4	May	4-8
Coreopsis grandiflora (perennial tickseed)	24-36	yellow	3	12	1-4	June	8-12
Delphinium spp. (larkspur)	18-36	blue, scarlet	4	18-24	1-2	June and July	12-16
Dianthus barbatus (sweet-william)	12-18	blue, pink	3	12-18	1-4	June	6-8
Dictamnus fraxinella (gas plant)	24	red, white	3	18	1;	June	4-6
Digitalis purpurea (forglove)	24-36	purple, rose, white	4	15-18	1-4	June	4-6
Eryngium giganteum (sea holly)	24	blue	3	18	1-2	June	6-8
Eschscholtzia californica (California poppy)	8	white, pink, brilliant orange	2	8~12	1-16	June	all summ
Gaillardia aristata (blanket-flower)	15-24	yellow	3	15-18	1-1	June	8-10
Gypsophila paniculata (baby's breath)	15-21	white	3	15	1-4	July	8-10
Heuchern sanguinea (alum root; coral bell).	15-24	crimson, rose	3	15	1-4	June	6–8
Iberis sempervirens (candytuft)	9-12	white	2-3	9-12	1-4	May	8-10
Lobelia cardinalis (cardinal flower)	48	carmine	3	15–18	1-4	July	4
Lupinus polyphyllus (lupine)	45	blue, delicate white	4	24-39	1-2	June	6-8

FAVORITE BIENNIALS AND PERENNIALS-Continued

Name of Flower	Hright, in Inches	Color of Floreer	D star an l Prockate Out	a Apart inches Permanen Plant og	Depth to 4pw (m)	Month of First Flower ag	Weeks lo Bloom
Lychou chal edon ca (Jerusalem erom)	36-45	scarles	3	12	1-4	Juna	4-6
Lychnis coronar a (mu e o pink rose cam p on)	21	rote	3	1" 15	1-4	Japa	4-6
Myonot a spp (forget-me-not)	10-10	blue wh to	3	10-12	1-4	Apr 1	all auromes
Onnothera b san s (even ng prunrose)	36-42	3rd om	2	18	18	July	6-8
Pepaver nucl auk Iceland poppy)	9-24	yellow pak acarlet	2-4	6-17	1 15	April May	6-8
Papaver or entally or cotal puppy	9-21	he ght museum	2-4	8-19	1 16	May	4.8
Papav 7 thoese th riey p ppp)	21-36	204	-4	17	1 10	Ney	4-8
Pentstemon harbury be al tongue)	30-42	pak to red	2	13	1 16	July	4-6
Petun a spp	12-24	white purple rose pink	·	8-12	1-4	June John	a l sustines
Phlos drummend (phlos)	6-12	w se yellow pak 1 lac purp e cranson	·	8-12	1 5 May		4-6
Platycodon grand florum (ba oca flower)	18	pynu wy u	3	1	1-4	June	4 6
Primula polyanthus (gold laced polyanthus)	8-10	er amy wh to o maroon	2	4	1 16	May	8-10
Pr mula vulgaria primross)	6.8	3 ellow	2	6-8	1 16	April	6
Pyrethrum app (pa ated da sy	13	white pak	3	12	1-4	June	6-8
Stoken a ryanea (Stokes aster)	la	blos	5	13	1 4	May	24
V ola tricolor (parsy)	8-19	blue yellow wh e mottled	1	10-12	1-4	March of arres	8-10

notes of the plants II a need as used in combination with a rock garden it should be informal. The one erick work should be carefully concealed with grasses and plants. The margins of the pool should be insering lar and just as natural in appearance as possible Iris murch margingle's rocketess dwarf speedwell pyrichrum columbine and other plants adopted to a most sod may be planted along the usuage possible.

the pool itself water libes and other water plants
Trellises arbors and pergolas lend interest to the
garden but these should always be draped with some
land of vine chimbing rose or other trailing plant

Weeds and Insect Pests

Once the gatien is planted weeds various mostpets and funge desizes demand attention Sturing the surface roal with a hoe throughout the growing the surface roal with a hoe throughout the growing season will keep down the weeds—these robber plants that steal the food and water from flowers and vegitables. The soil should be cultivated only to the depth necessary to destroy the weeds as deeper entivation is likely to injure the roat of the plants.

Vation is likely to injure the roots of the panel.

Our battle with insect pests and fungus diseases should begin before these enemies swoop down on the garden Fungus diseases such as mildews and rusts,

are controlled by sprays containing salts of copper of which Bordeaux mixture is the best known On the hasts of their feeding habits insect pests are clared as chewing sucking or borng insects. The chewing kinds caterpillars beetles and other insects that eat the foliage must be killed by a stomach poison arcenste of lead or paris green for example The sucking unsects (plant lice or aphids, leathoppers and the like) which pump the juices out of the plant taxues must be smothered by oils or dusts or killed with paralyzing contact poisons such as picotine. The borers tunnel through the branches and roots of trees shrubs and other plants and must be hooked out with a wire Burning the refuse and stubble in the field will help rout the corn borer (See Spraying ) We should remember that not all insects are pests Bees butterfiles moths and many others play their useful part in the pollmation of flowers Others assist in the war against harmful insect pests by preying on these varieties (See Insects )

Watering and Protecting the Garden
In order to thrive the garden needs frequent watering throughout the growing season Usually a thorough
watering once a week, mustening the soil to a depth

of at least four inches, is sufficient. Merely sprinkling the surface of the garden soil is worse than not watering the garden at all, for it causes the plant roots to reach for the water and come to the surface.

Winter protection of the trees, shrubs, and perennial plants of the garden must not be neglected. A mulch of hay or straw over the perennial plants after the ground has been frozen will protect them. Partly rotted manure, burlap, hay, straw or even ashes may be spread around trees and shrubs. The main purposes of a winter mulch are to prevent damage to the plant roots from alternate freezing and thawing, and to reduce evaporation of the moisture from the soil.

#### Some Practical Selections

Among the multitudes of flowers grown in gardens a few only have withstood the test of time. The unskilled gardener should not experiment with untried novelties. Annuals are most easily grown, but should be chosen definitely to fit the purpose. Most perennial flowers will thrive on moist soils, and should be selected carefully for the place they are to occupy as they improve year by year until crowded, when they must be taken up, divided into smaller pieces and replanted as at first.

Ten annuals useful as cut flowers: Sweet alyssum, China aster, baby's breath, coreopsis, Swan River daisy, nasturtium, pansy, sweet pea. Chinese pink, ten-weeks stock.

Six fragrant-flowered annuals: Bartonia, mignonette, sweet pea, ten-weeks stock, sweet sultan, sweet alyssum.

Six climbing annuals. Balloon vine, hyacinth bean, cypress vine, Japanese hop, moon-flower, morning glory.

Six annuals for sunny places: Love-lies-bleeding, balsam. hyacinth bean, gaillardia, nasturtium, rose moss.

Six annuals for shady places: Godetia, musk, nemophila, pansy, tarweed, wishbone flower.

Six annuals for rocky places: Annual phlox, candytuit, catchfly, clarkia, nasturtium (dwarf), rose moss.

Six annuals for sandy soils. Clarkia, poppy, godetia, nasturtium (dwarf and tall), rose moss, zinnia.

Six annuals for heavy soils: Annual chrysanthemum, godetia, sweet pea, petunia, sweet alyssum, pot marigold. Six annuals that bloom after frost: Sweet alyssum, candy-

tuft, cornflower, mangold, annual pblox, ten-weeks stock. Tall perennials: Hollyhock, plume poppy, golden glow, double perennial sunflower, sneezeweed, late sunflower,

Maximilian's sunflower. Medium height perennials: Common columbine, bleeding heart, European peony, sweet-william, Chinese peony, forglove, oriental larkspur, peach-leaved beliflower, oriental poppy, perennial gaillardia, Japanese iris, balloon-flower, beebalm, swamp rose mallow, late perennial phlox, Japanese anemone, subsessile veronica, bardy chrysantbemums.

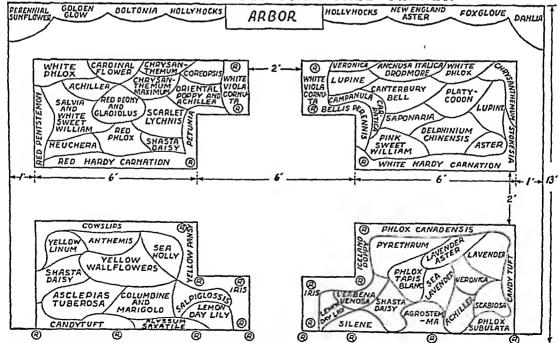
Low-growing perennials: Japanese adonis, crested dwarf iris, dwarf flag, golden tuft, moss pink, English daisy, white rockcress, Geneva bugle, tufted pansies or violas, snow-insummer, woolly yarrow, Canada anemone, Carpathian harebell, coral bells, purple poppy mallow, hardy leadwort, smoothish fleabane, Napoleon III pink.

Perennials with fragrant flowers: Winter heliotrope, California and Russian violets, white rockcress, woodruff, lilyof-the-valley, peonies, gas plant, valerian, lemon lily, dwarf orange day lily, Scotch grass pink, fringed pink, swect rocket, beebalm, entire-leaved bush clematis, August lemon lily, white day lily.

Perennials for cut flowers: Christmas rose, California and Russian violets, foxglove, oriental larkspur, everblooming ragged robin, pearl achillea, Japanese iris, Miss Lingard

phlox, Japanese anemone.

#### PLANTING AN OLD-FASHIONED GARDEN



This is the plan for a colorful summer garden on a plot 13 by 20 feet. If bulbs, such as tulips, are wanted for early spring flowering, they must be put into the ground the previous fall. Roses are to be planted at points marked "R."

WHAT AND WHEN TO PLANT IN THE VEGETABLE GARDEN \*

WHAT AND WHEN TO PLANT IN THE VEGETABLE GARDEN.\*

The date of planting shown in the tables are approximate for the United States and will vary with the season. The modifying his between North and South as considered to be the continuation of the southern boundary of Prevailing his between North and South as considered to be the continuation of the southern boundary of Prevailing the Southern Sout

Kind of Vegetable	Required for 105 Feet of Ros	(N - N . c) R . R. eth)	Dutance between Plants	Dapth of Planting	Time Required to Secure Crop after Planting
Asparagua	60 to 80 plant		2 ft	5 to 5 to	I to 3 yr
Beans bush (kidney sod hma)	J qt	N- April to July 3- Feb to Apr (Aug.)	2 to 4 m	1 to 2 so	40 to 65 da.
Beans pole (kidney and   ms) Boute	ion les	May and June Farly spring	18 to 24 m 4 to 5 la	1 to 2 io	50 to 50 de 55 to 75 de
Brussels sprouts	\$ ex	V- May to June Jan to July	] to 2} ft	1 1n	100 to 125 da.
Cabbage early	} oz	N-Mar-April (etart in hother Feb.) C Oct to Det	14 to 15 in	ž m	110 da from placts
Cabbage late		- May and June - June and July	13 to 24 10	g an	150 de from plaota
Carrots Cauldower	105	Early spring May 15 to June 15 Vary 15-June 15 (hothed in March)	3 to 5 to 1] ft	\$ to \$ to	80 to 110 da. 105 to 130 da.
Colery	j cs ·	Vay for early crop (start under glass in Mar or April) July for late crop (sou seed in May)	4 to 8 10	1 10	160 to 170 da from seed 90 to 100 da from plants
Chard (Swise)	+ 01	Early spring to June 15	4 to 6 iz	<b>\$</b> 10	To middle of sum
Com sweet	2 to 3 os	Early spinst	12 to 18 m	j to 1 is	80 to 100 da.
Cucumber	1 os	- May to Jets	4 to 8 ft.	i to 2 is	80 to 80 da
Legplant	t os	June Jen to May	2 to 2 ft	1 to 1 1s	120 to 1c0 ds.
Kohlrabi	1 cs	N- April to Jupa S- Sept to Mer	6 to 8 in	1 10	75 to 120 da
Lettuce	} to 2 os	Y- April to Aug 3- Oct to Mar V- May 15 to June 15 (now seed	12 30	12 to 1 22	60 to 90 da.
Melon mukmelon	} 05 ·	undre gless April 18	111	1 to 2 15	110 to 130 da.
Molon, watermelon	for	N- May 15 to June 15 3- Mar to May	7 to 10 ft	j to lin-	315 de
Okes, or gumbo	11 to 2 to	S- Feb to April	14 to 35 io	1 to 2 la	115 da
Onson seed	i cs.	N- April and May	2 50 4 10	t in	135 de
Omon, sets	1 to 1} qt	N- Early spens	2 to 4 in	g in.	50 ds
Parsley	ž ca {	N- Lest of Mar to let of April 3- Rept to May	3 to 5 10	j jm	95 to 120 da
Parsupe	1 cs	April and May	3 to 6 15	<b>\$</b> 10	125 to 180 da.
Pens	f qt	N- Early spense  Det to April	10 to 15 m	1 to 2 1a	60 to 80 da.
Pepper	205	N- May and June (start early plants under glass in Blac)	18 to 24 in.	j to lin	100 to 140 da.
Petato sweet	31b (ce 75 d) ps)	May and Jupe (start in bothed in April)	16 to 18 12	B 11	140 to 180 ds
Potato white	5to 515 tubers	N- Mar to Just S- Jan to April	12 to 18 in	4 10	80 to 140 da f 10 to 145 da
Pumpking	los	N- May to June S- April and May	2 plants in	1 to 2 10	110 to 140 ca
Radish	1 00	N- Mar to And S- Sept to April	1602111	łm.	30 to 40 da
Rhubarb	2.5 to 50 roots {	N Early spring S Fall N June to July	2 to 4 ft S in	2 to 3 12	1 to 3 yr 70 to 100 da.
Rutabaga	\$ to los {	S— Aug to Sepl-		∮to∦m ∳tolin	135 to 105 da.
Salarty	104	Early spend N- April to Sept 25	Sin Sin	\$ to 1 in	130 to 100 da.
Bpinsch	106	R. Aug to Oct.	}	1 1	
Squash bush or serly	100	N— May S— Feb to Mar N— May	3} to 6 ft 0 to 10 ft	lin.	55 to 75 ds. 125 to 150 ds.
Squash late	104	S Feb to Mer N May to Jumb	29 to 4 ft	1 10	130 to 150 da.
Tomato	2 cs {	S- Jes i	21 to 5 fo	1 10 2 10	100 to 150 da.
Turnip	to 1 ca	Early spiring			
*Reprinted by sourcesy of Inte	matienal Corres	pondrace Schools, Scruston, Pt.	Copyright 193	7, by Laternal	oosl Testbook Co

### AMERICA'S Second MARTYRED PRESIDENT

ARFIELD, JAMES ABRAM (1831-1881). When Gar-Garage field was assassinated on July 2, 1881, many comparisons were made between his life and that of Abraham Lincoln, the first "martyred president." Both were "self-made men." Both were born in log cabins, and endured in youth the privations which accompany farm life on the frontier-Lincoln in Illinois, Garfield in Ohio. As a young man, Lincoln took a flatboat down the Mississippi River; Garfield at about the same age served on a canalboat on the Ohio and

Pennsylvania Canal. Both were eager for an education; but while Lincoln attained his knowledge by studying at night alone, Garfield was able by hard work to obtain a college education.

Garfield was born of poor parents in Cuyahoga County, Ohio, a few miles southeast of the present city of Cleveland. His father was a farmer. From an early age the future 20th president was a tireless reader. One of the many books he read and reread beside the flickering flame of the wood fire in the log cabin was a book of sea stories. These so caught his youthful fancy that he resolved to become a sailor. At 17, with his mother's consent, he tramped across the country to Cleveland and tried to ship on a lake boat.

The captain drove him from the deck, and the disappointed lad had to content himself with a job on a canalboat, driving the mules along the towpath and acting as deck hand. A lucky attack of sickness sent him home, and his ambitions were turned to higher fields. By the time he recovered, his mind had been set on becoming a teacher, and he started off to school with a slender capital borrowed from his widowed mother. After his first term he needed no more help from her, for he worlsed his way through the Western Reserve Eclectic Lastitute at Hiram, Ohio (now known as Hiram College), by farm labor and carpentering. When he was ready to enter college his choice fell on Williams Col lege, because its president was the celebrated Mark Hopkins, for whom Garfield had the greatest admiration. Garfield used to say, "A log with a student at o" and Mark Hopkins at the with a student at o ne end and Mark Hopkins at the other is my ideal college." He was graduated from Williams in 1856.

Garfield:
When, at the age is a College President
When, at the age is 26, Garfield became president
of the Ohio college where he had taken his preliminary
work, he proved himseld teacher of the same type as
Mark Hopkins—a man of unbounded zest for truth.

limitless curiosity, and intense interest in his pupils. Had he remained in this work, he would doubtless have become one of the country's great educators. It is interesting to know that his four sons also went to Williams College, and one of them, Harry Augustus, became its president. This son served during the first World War in the post of fuel controller. The second son, James Rudolph, was secretary of the interior under President Theodore Roosevelt. The third, Irvin McDowell, attained eminence as a lawyer,

and the fourth, Abram, as an

architect.

Garfield's rise was rapid. Within six years after his graduation he had been president of Hiram College, Ohio state senator, major general in the United States Army, and representative-elect to the United States Congress. A more rapid rise than this has been made by no American statesman, and the variety of the positions shows that he himself practised his advice to young men, to "be fit for more than the one thing you are now doing."

Service in Civil War

While teaching at Hiram College, Garfield studied law; and from the time of his admittance to the bar, in 1859, until his death, he was continually engaged in politics, with the

exception of the two years that he served as an officer

in the Union Army during the Civil War.

Though he was a brave soldier and an able officer, and in 1863 was commissioned major general for his courage and resourcefulness at the battle of Chickamauga, President Lincoln thought Garfield would be of greater use to his country in Congress. So he resigned his commission, in December 1863, and took the scat in the House of Representatives to which he had been elected the year before. There he made himself especially useful in the committees on military affairs and on finance. He served for 17 years in the House—until his election in 1880 to the Senate from Ohio; and it has been said that his speeches in Congress give a connected history of the times. Garfield was an impressive orator, because he had a powerful voice, great personal magnetism, and a straightforward style of address which aroused enthusiasm and carried conviction.

The triumph of his political career came when he unexpectedly received the Republican nomination for the presidency in 1880. The party was divided that year into two factions-the "stalwarts," who wished Grant to be nominated for a third term, and the



GARFIELD

"half heeds" who opposed Grant and fer the mort part invored James G Blame Neither sade would yield, and after s long fight they compromeed on James A. Garfield, a"dark horse Because Garfield was a "hall-breed," Chester A Arthur an uncompromising "stalwart," was made the candidate for the vice-president.

His Personal Appeal to the People
In the campaign which followed Garfield spoke in

his own behalf, the first time that a premental candidate had thus appeared before the people. He won an impressive victory with a total of 224 electoral votes to 155 given to General Hancock the Democratic candidate.

Garfield never had a chance to show has ability as once executive of the country. Four mostles faire has nauguration he was shot by Chinles Guiten a dapoponited office-scelet. The tragedy was the result of the bitter quirrel between the stalaars and "inlikibreds" over appointments to office a quarrel which absorbed all of the presidents time before he was shot

The day of the tragedy was to have been a red letter day in the presents it is. If was on his way back to his beloved college, Williams from which he had been graduated 23 years before to go on in the reuses of his classmates. The seasons a bullet strick his sown as he was walking through the radway taken in Washington to his train. After happening between the same death for reach confident of the season was the same than the same t

GARRALDI, Gryssere (1807-1852) "The that thus she charm," according to the del symp plus it was the fourth attempt which brought Guseppe Gaphaldi, the kinght errant of Itahun unrul, he spale success and enduring fune. Twee he joued in van attempts to fire Italy from Austran rule first in 1834 and again in 1848—and both times he was forced to fee from the country. In 1834 be escaped to South America ruth, a sentence of death banque, over he may be a first of the sentence of

Returning to Italy he took part in the insuccessful Revolution of 1983 and commanded the forces of the Revolution of 1983 and commanded the forces of the short-lived Roman Republic which he and Maximi set up. When this collapsed Garbaldia crayed in a wonderful retreat through central Italy pursued by the troops of four countries. This time he sought refuge in New York, where he engaged for several Years in trade and commerce and succeeded in accumulating a small fortune.

His third opportunity came in 1859 when Sardmis-Piedmont with French aid west to war with Austra Garibald is Alpine infantry was victorious in the north, but further advance was checked by the peace made with the Austrians at Villafranca by the faint-hearted Napoleon III Secretly encouraged by Cavour, the great prime

minister of Piedmont, Gambaldi and his 'Thousand Red Shirts 'est forth in 1860 for Sicily, on one of the greatest filibustering expeditions in history and one that eventually gave to his king Victor Emmanuel the remaining half of Italy Within a few short weeks after landing and assuming in the name of Victor Emmanuel the dictatorship of Siedy, Garibaldi had driven all the Neapolitan forces out of the island with little loss of life to his own men. He had come into possession of money, arms, boats, stores of all kinds. had increased his army to some 25 000 men, and had become the idol of all Sicily, to whom the red shirt of his warners became the proudest badge of men and women He had so completely aroused Italy that each town poured forth its young and old to join his victorious etandard

He Enters Naples in Triumph

When Garibaldi crossed from Siedy to the manihad, in August 1860, his march from Reggio to Neples resembled a triumphant procession. It was only necessary for Caribaldi to Appear before a town for it to surrender. At one place with a few hundred men back of his he erdered 1200 Nespoitant proops to surrender, and they immediately did so for his cause, was really their cause. He eathered haples in the midst of enthmassic crowds, wildly thering and angaing the national antheir from now on called the Garibaldi Hyma. In accordance with the votes of the people Garibaldi handed the kingdom of Seidy and Niples over to Victor Emmanuel, whom he acknowledged as the king of Tau

Gardalda himself, although he was the hero of Italy, was the most difficult problem that the new government of united Italy had to face He never forgave Cavour for the cession of Nice-Garibaldia birthplace-to France as the indispensable price of Napoleon III s and to Italian unity Only with diffi culty was he restrained from his mid plan to attack Rome which was under the rule of the pope although he knew that an attack on it would bring against the struggling kingdom of Italy the forces of both France and Austrus-her friend and enemy Twice the government was forced to send troops after Garibalds and take him prisoner, in 1862 and 1867 When finally Italian troops entered Rome in 1870, Garibaldi had no part in it for he was at that time helping the new born republic of France in its despairing struggle against Germany

When the Franco-German war was over he retured again to his shand home of Gapters, where he spent the rest of his life receiving admiring visitors and attempting text up the people to establish a republic in Italy. He was easily worked on by uncompilious approach who have been appropriately the proposed on the contraction of the contr

### Making GARMENTS by the MILLION



Mass production of clothing is possible because of two types of power-driven machines—cutting and sewing machines. The straight-knife cutting machines shown in this picture can cut through 200 to 300 layers, the number depending on the nature of the material. The roller at the extreme left travels back and forth along the table, laying cloth from the roll evenly in layers.

GARMENT INDUSTRY. Making clothes is one of the world's biggest businesses. In the United States, manufacturing garments and similar, products ranks sixth among all industries in number of employees, with more than a million workers. In normal years the clothing made sells for about 8 billion dollars in retail stores.

This huge industry consists of "the cutting-up and needle trades." Factory owners buy woven and knitted fabrics from textile mills. Workers in the factories cut up and sew these materials. Among the products they make are coats, suits, skirts, dresses, shirts, blouses, hats, caps, pajamas, nightgowns, underwear, gloves, belts, and scarves.

Most factories make only one or two kinds of garments. One factory may make women's dresses, an-

other men's suits and coats, a third women's and children's underwear, and so on. As a rule a factory does not make both men's and women's garments. Some manufacturers of men's suits and coats, however, make similar garments for women as a side line.

There are three types of producers. Manufacturers make finished garments Their workers earry out all the processes of designing, cutting, sewing, and selling to retailers

Their factories are called "inside" factories. Jobbers design garments and usually cut them out. They send the garments to contractors for sewing or for both cutting and sewing. Contractors' establishments are called "outside" factories. Contractors return finished garments to the jobbers, who sell them to retail stores.

In spite of its size, the garment industry is not streamlined. Instead of a few big firms doing most of the business, there are more than 30,000 factories Nine-tenths of these have less than 100 employees.

One reason for this situation is that a small garment factory does not require much capital. The machines used are inexpensive in comparison with the machines of most big industries. Many processes are best carried out by hand. Making clothes does not

take much space. So every year many people with a little capital set up small new clothing factories.

The factories almost always remain small. Factories grow big in industries in which machine production on an assembly line is possible. This type of production means that many thousands of articles are made exactly aluke. Such standardization is not possible in the garment industry because of the way people think



This machine sews from 4,400 to 5,000 stitches a minute. The speed depends on the weight of the material and the nature of the sewing. An expert hand sewer can do only 30 to 40 stitches a minute.

and feel about clothing. They like to be in style but they do not want to look rust like everyone else. They may not like a garment even if it has been designed according to the latest fashion. Each new design in a coat, suit, dress hat, or even underwear is a risk to the manufacturer. He cannot afford to make too many stems alike. So production on a small scale is usually safer and just as profitable as production on a large scale

These facts are most important in the case of women's garments. They are somewhat less important in the men's wear industry. They are least im-

portant in the case of standardized garments such as work clothes Cactories therefore are smallest in the nom en's garment industry Those with only 20 to 50 employees are the most important group The highest percentage of larger factories is among firms making foundation garments and house dresses

Among factories that make men s and boys' clothes, those with 100 to 250 employees do the most business. The highest percentage of larger factories is among those making work shirts However, a number of factories making men sand boys' suits and coats have over 1 000 employees The East leads in

clothing manufacture New York State makes about 45 per cent of the clothing and similar products manufactured in the United States Pennsylvania produces about 10 per cent

New York City is the chief center There are thou sands of small factories between Srath and Eighth Avenues from 32d to 40th Streets Some are housed in skyscrapers an I some is old loft buildings More than 300 000 people work in these factories Streets in the neighborhood are clogged with hand trucks, auto trucks, and automobiles loaded with supplies finished garments, and bundles of cut-out garments for cor tractors Dehvery boys wheel racks of garments along the sidewalks, going from contractor to jubber or from factories to New York City stores Retail buyers from all parts of the United States come to the district to select merchandise for their home-

New Jersey and Illmors each make about 5 per rent

town stores It is the nation's fashion capital Other leading centers of the garment industry are Philadelphia Jersey City, Chicago Los Angeles

San Francisco, Boston St Louis Cleveland Cincinnata Baltamore and Dallas. The California centers are especially important in aports and casual styles for both men and women

#### Clothing Factories in the 19th Century

The ready-made clothing industry was important in the United States by 1850 It produced close to 50 million dollars worth of clothes that year. But there were no factories in the modern sense. Manufacturers had garments designed and cut out in their shops and then make them out to workers to sew at home (See also Clothing )

THIS IS ALMOST AN ASSEMBLY LINE



secre will came logelast al

In 1846 Elas Howe invented a practical sawing machine (see Sewing Machine) This made possible faster sewing by less skilled workers. About the same time textile factories began to turn out cheap fabrics Immigration supplied men women and children who would work for low wages The garment industry began to grow, with its workers gathered together in

shors or factories instead of scattered in homes

The Cryd War helped the new industry develop Both the government and private manufacturers set np large zhops for making uniforms Managers learned to dayade the sewing into separate tasks for skilled and unabilled workers As thousands of soldiers were measured for uniforms, a definite relation between their various measurements was discovered. A man with a certain chest measure usually had a certain waist measure, and so forth This discovery was the first step toward the grading of patterns in standard sizes Today this practise enables factories to make cloth mg that fits most people When the Civil War was

# THE WORK THAT GOES INTO A READY-MADE DRESS



These Chicago Daily News photographs show how a woman's dress of good quality is made. 1. Designing comes first. The success or failure of a garment may depend on its design. 2. The designer chooses a material and begins to drape a sample dress.



3. After patterns have been made in various sizes, they go to cutters. These men lay patterns carefully and mark around them with chalk. They cut the most expensive dresses with shears. 4. The parts are sent to machine stitchers to be sewn together,



5. Expert finishers work at the hand-sewing table. Hand sewing is still a feature of the best quality dresses, suits, and costs.
6. After the dress has been examined and pressed, a worker drapes it, adds a belt, and adjusts the hemiline.

over, many of the factories that had made uniforms turned to making civilian clothes

Power for the Growing Garment Industry

Workers operated the first sewing machines by hand pressure or with a treadle About 1865 an overhead shaft driven by a steam engine was introduced. The power was taken by helts to individual machines. This gave more speed to the machines with less strain on the workers. Sewing machines run by electricity began to appear in 1889 By 1900 these could sen 4 000 statches a manute A speed of about 5 000 statches a minute is possible today. There are machines and attachments for all types of sewing procedures

At first all cutting was done with shears Steam driven cutting machines appeared in the 1870 s and were replaced by electrically operated ones in the 1890 s Modern straight-knife machines cut through layers of cloth to a height of 8 mehes Machines with a round rotary knile are used for lower lays

Workers in early garment factories used stoveheated flatirons A mechanical steam pressing machine was invented in 1904. Today there are electric and steam pressers of all convenient sizes and shapes In addition there are electric irons with compartments for water, which produce their own steam

Who Are the Garment Workers?

Irish and German immigrants were the first workers in the garment industry. New waves of immigration contributed Poles, Austrians, Hungairans Russians Italians and Jews of various European backgrounds Most workers in the new industry toiled long hours in miserable surroundings earning barely enough money to keep alive (See also Sa eatshop System )

Labor laws and gradual unionisation of the workers remedied most of the evils which had marked the ear her days of the industry Remnants of the swesting system linger chiefly in contract factories and in homework in towns and rural areas near some of the hig clothing centers. In such areas, local authorities may be lay about labor laws in order to attract new industry Lack of unionization among workers makes it poss ble for employers to pay low wages

Most garment workers today are skilful and well paid About three-fourths belong either to the International Ladies Garment Workers Union or to the Amalgamated Clothing Workers of America

Garment workers are specialists Designers are the artists of the industry Pattern makers and graders are draftsmen Cutters are mechanics They must be able to lay a pattern of many pieces m such a way that no material is wasted and all checks plaids and stripes match at the seams. They must be able to cut accurately through many layers Cutting is the highest paid trade of the industry Pressing requires skill and judgment. It too is highly paid. Sewing breaks down into many different procedures. It may take 200 stitching operations to make a man's suit These vary in difficulty and in rate of pay

Training for work in the garment industry may take place on the job or in a vocational high school New York City has a Central High School of Needle Trades

MANY TAILORS MAKE MEN'S







GARRICK, DAVID (1717-1779). From the moment in 1741 when he stepped on a London stage until his retirement in 1775 David Garrick reigned supreme over the English theater. The five-foot four-inch Garrick played both comic and tragic roles with great success. After his burial among England's great in Westminster Abbey, Edmund Burke wrote of him: "He raised the character of his profession to the rank of a liberal art."

Garrick changed the style of English acting. When he first came to the stage, actors delivered their lines as formal declamations. Garrick flamboyantly delivered his in the spirit of the character and the words. His style of acting would be called florid today, but then it was deemed naturalistic.

Garrick, the grandson of a French Huguenot refugee of the gentry, was born Feb. 19, 1717. His father was an English army officer who had only his pay to support a large family. The Garricks lived in Lichfield. David's vivacious charm made him a great favorite at the regimental officers' mess. Lifted to the table, he would drolly recite parts heard from strolling players.

David attended the Lichfield grammar school with Samuel Johnson, who was seven years older. Later, when Johnson opened his own school, David and a younger brother were pupils. Johnson's school was not a success. He and Garrick journeyed to London together, Johnson to find work at translating and Garrick to study law. Garrick's father died soon after, however, and David and an older brother started a wine business, with David the London representative.

Garrick Goes on the Stage

The wine business did not prosper, perhaps because Garrick's interest in the stage and actors took much of his time. Masked, he took part in a pantomime. Then, in the summer of 1741, he played with a traveling troupe at Ipswich. Although he knew his family would object, he determined to go on the stage. He returned to London and played his first London professional engagement as Shakespeare's Richard III in the Goodman's Fields theater.

His success was immediate. During his first year he played some 19 roles, almost all of which were greeted with acclaim. Johnson said of his success: "More pains have been taken to spoil that fellow than if he had been heir-apparent to the empire of India." Although Johnson often jibed at Garrick himself, he would permit no other to do it in his presence (see Johnson, Samuel).

Over the next few years Garrick played in London's famed Covent Garden and Drury Lane theaters and in Dublin. In 1747 he became a partner in the Drury Lane (the fourth theater of the name now stands on the site). As actor-manager, Garrick continued on the stage, except for two years travel on the continuent, until his retirement. He played more than 90 roles and wrote some 80 prologues and epilogues and innumerable verses and songs. He either wrote or adapted 35 plays; many were adaptations of Shakespeare's plays (a common practice of the time). Some

DAVID GARRICK



One of the world's most famous actors, Garrick was for many years actor-manager of London's famous Drury Lane Theatre-

of his plays were very successful, but none of his writings show great literary merit.

Garrick formed an early attachment for Margaret (Peg) Woffington, a famous actress, but they never married. He did marry Eva Maria Veigel, a Viennese dancer and protégée of Lord and Lady Burlington, in 1749. They had no children. Garrick died in London Jan. 21, 1779.

GARRISON, WILLIAM LLOYD (1805–1879). Regarded by some as a high-minded idealist who was the chief exponent of the antislavery movement, William Lloyd Garrison was regarded by others as an impractical fanatic who performed some good in a disagreeable manner. He helped to found the American Anti-Slavery Society, was for 23 years its president and for 35 years published the violently antislavery publication the *Liberator*.

Garrison was born Dec. 10, 1805, in Newburyport, Mass. His father, an intemperate sea captain, deserted the family before the boy was three. At 13 years old, Garrison was apprenticed to a newspaper publisher. He became an expert compositor, and by the time he reached 16 was writing anonymously for the paper. At the end of his apprenticeship, when he was 21, he became editor of the Newburyport Free Press. In it he published the earliest poems of John Grecnleaf Whittier, his lifelong friend (see Whittier).

Garrison was almost six feet tall, had sharp features somewhat softened by spectacles, and carried himself erectly. When the Free Press failed he went to Boston where he helped edit the National Plulanthropist a paper devoted to the suppression of in temperance and other vices. In Boston he met the Quaker Benjamin Lundy who turned Garrison's attention to the evily of slavery

In 1829 Garrison gave his first violent address against slavery Later the same year be went to Baltimore to help Lundy edit an antislavery paper One of h s articles brought about his arrest for bhel He was convicted and served seven weeks of a pail term On Jan 1 1831 he published the first issue of the Laborator

Garrison's vitriolic attacks on slavery took him several times to England and about the North Georgia offered a \$5 000 reward for his airest and con viction. In Boston a mob once placed a rope about his neck and forced him to parade the street. He helped form several antislavery see eties among them one in New England and Liter the national one He preached that the North should secone from the South in Boston in 1854 he publicly burned a copy



tislavery cruseder is shown cetting an editorial kly the L berefor which he published for many ye

of the United States Constitution crying So perish all compromises with tyrannyl

After the Emanespation Proclamation (1862) he continued to issue the Liberator until satisfied that slavery was dead. He stopped publication in 1865 Garrison married in 1834 and resided in Roybury

then a suburb of Boston He had seven children two of whom died in infancy Weakened by chronic ill health Garrison was in 1868 tendered the sum of \$30 600 by his admirers. He d ed in New York City on May 24 1879

GARY IND The newest and biggest c ty of the busy Calumet industrial region of northwestern In dians is Gary Between its west limits and the Illi nors state I me he the earlier established cities of the reg on East Chicago Whiting and Hammond All except Hammond border Lake Michigan's southeramost shore Ch cago a Loop is about 25 miles to the nothwest

The champers of great steel plants cement works oil references and other industries tower from the lake front At night tall stacks belch yellow flames and electric bulbs placed scatteringly over high reaching oil refinery towers form unique and awesome patterns against the sky Harbors protected by breakwaters that reach far out into the lake bate deeply into the shore. The harbor basins are large enough in which to turn about the biggest of the great ships that bring non ore coal and limestone to the reg on The Calumet area produces iron and steel rubber goods clothing books fabricated steel automotive accessories and many other goods

Founding of the Steel City

Gary had its beginning in 1905 when Judge Elbert H Gary chairman of the board of the United States Steel Corporation announced that a large new steel plant would be built on the sands at the south end of Lake \Ischegan Construct on work on the plant began in March 1906 and the city grew up behind it

The site was a dreary maste of sand marshes wind blown sand dunes and scanty vegetation. The general ground level of the mill site had to be raised 15 feet. This was done by leveling the tall dunes over the marshes The Grand Calumet River was made to flow through a new channel rail lines were relocated and the sands anchored so that they would not shift under the weight of thousands of tons A boom vil laze of tar paper shacks went up to house workers restaurants and stores In February 1909 the first steel furnace was fired

Business and residence areas were carefully planned As the plan took form straight wide streets were payed and the tar paper shacks replaced with new bouses and business buildings Black earth by the train load was brought to cover the sand so that grass and trees could grow, On the lake front Marquette Park mamed for the Jesuit explorer and missupary who passed through the Calumet region in the late 1600 s was laid out with lawns trees flower beds athletse fields and a fine beach. Gary now has about 700 acres of parks

The Gary school system, under Dr. William A. Wirt (1874–1938), originator of the educational "platoon" system, employed many new methods. In the Gary system all children, from kindergarten through high school, may work in school kitchens, laboratories, studios, gymnasiums, and in shops in which such trades as carpentry, painting, printing, and metalworking are taught. These progressive techniques were widely admired. Many other schools adopted them. Gary today has more than 100 churches, an excellent library system, a symphony orchestra, and

an extension center of Indiana University. One of its nine railroads is a fast electric line running between South Bend, Ind., and Chicago.

Thousands of native American whites and Negroes and immigrants from some 50 nations were attracted to the fast-growing steelmaking city. In 1910 Gary had already grown to 16,802 people. By 1920 these had increased to more than 50,000. In the 1950 census the population of Gary was 133,911, making it Indiana's second largest city (see also Indiana). Gary has the mayor-council form of government.

# GASES—The Most ACTIVE State of MATTER

GAS. The most active state in which matter can exist is as a gas. When solids are left to themselves, they will keep their shape undisturbed. Liquids will alter their shape, but they will hold their volume. Gases, however, have neither fixed shape nor size. Turn loose a thimbleful of air into a vacuum as big as a living room, and it will expand and spread out until it fills the whole available space.

The most familiar gases are those that form the air (see Air). Eleven of the chemical elements remain in a gaseous state at ordinary temperatures. They are hydrogen, helium, nitrogen, oxygen, fluorine, neon, chlorine, argon, krypton, xenon, and radon. Many chemical compounds such as ammonia and carbon dioxide are gases. Solids and liquids will enter the gaseous state at sufficiently high temperatures, as water does when it turns into steam.

Physical Nature of a Gas

Every gas consists of individual molecules, flying about freely in space and colliding with each other. For example, at ordinary temperatures and at atmospheric pressure, oxygen molecules in the air fly about at an average speed of about 1,500 feet a second between collisions. They collide, on the average, about 4.6 billion times a second and travel about 1/250,000 of an inch between collisions.

If a gas is free to expand (as it would be if it were loose in the air) the collisions will drive some molecules outward at the edges of the mass. This causes the gas to expand indefinitely and mix with any neighboring gases. If the gas is held in a container, many molecules strike constantly against the container surfaces. This bombardment exerts pressure upon the container.

Temperature, Pressure, and Volume

In 1660 Robert Boyle tested the relation between the pressure exerted upon a confined gas and the space it occupied while the temperature was kept unchanged. He found that any change in pressure produced an opposite change in volume, and so the product of pressure and volume remains constant. This is called Boyle's law.

The relation depends upon keeping the temperature unchanged, because temperature determines the heat energy in the gas, and the intensity is fixed by the average speed of the molecules. If therefore the temperature is kept the same while a gas is being compressed, the molecules will have the same average speed after compression as before. They will be crowded into much less space, however, and on the average will strike each unit of area in the container more blows every second (or other unit of time) in proportion to the reduction in volume.

In 1785, J. A. C. Charles of France experimented by letting gas expand as the temperature was raised while keeping the pressure constant. Each time the expansion amounted to  $\frac{1}{2+3}$  of the volume for an increase of temperature from  $0^{\circ}$  C. to  $1^{\circ}$  C. and the same amount for each additional degree of rise in temperature above  $0^{\circ}$  C. This discovery is called Charles's law. Since in modern physics a temperature of  $-273.16^{\circ}$  C. (or  $-459.69^{\circ}$  F.) is considered absolute zero (complete absence of heat), the increase in volume is in proportion to the increase in absolute temperature.

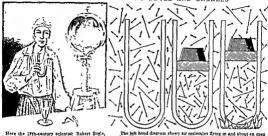
This increase in temperature is due to the fact that added heat energy has increased the average speed of the molecules. If held in the same space, they strike more and harder blows upon the container, thus increasing pressure. Pressure can only be kept the same by providing enough additional space in the container

GAS HELPS TO BURN STEEL UNDER WATER



The metal nozzle in the diver's hand and the steel plates of the sunken ship are both connected to an electric circuit. When the nozzle touches the ship, an arc is formed. At the same time a stream of oxygen flows from the nozzle. The oxygen and the intense heat of the arc together burn up (oridize) the steel and cut open an entry into the vessel.

### GAS LAWS DISCOVERED BY BOYLE AND CHARLES



Here the lith-century ecientist Robert Boyle, demonstrates the apparatus he used to discover his abw concerning effects of pressure upon gases. He obtained various pressures with his improved warsion of an art pump and applied them to air confined in the ciesed and of a manometer is tube purishly filled with mercury and open to atmosphone pressure at one end

In the 19th century, Jacques Charles and J L Gay-Lussec each established the related law that pressure varies in proportion to temperature How air and other gases yased in these ways to pressure and temperature changes is shown at right

The left hand diagram shows air molecules flying in and about an open tabe. When they stake the jube or other molecules, they exert pressure at each level and freezing temperature, the pressure amounts to 14 7 pounds to the square such. But smooth of pressure is called one of mosephere.

to the equive man aims amount on pressure is called one elimephine. In the contert diagram, a weight applies this pressure through a piston to the gas in the tube and compresses it to a certain volume. If next the total pressure (from the weight and elemosphere shows) is doubled the gas will be compressed into their the volume shown provided the temperature is keep unchanged (Boy's' is law.)

In the right hand daspram, air confined under a weight of one atmos-phere as heated. This makes the molecules fly faster and hit harder wher-ever thay strake, that is, they exert more pressure, until they relieve the extra pressure by expanding the volume they occupy (Charles's law)

to keep the strength of blows the same upon each unit area of the container surfaces

In nature, any application of force to a gas usually produces a combination of changes in temperature pressure, and volume To work such problems, Boyle's and Charles's laws can be combined into a general gas law that can be stated as a formula pv=LT (p is pressure exerted, r is volume occupied, T is absolute temperature, and & is a constant value which depends upon the number of gas molecules that are present, but not upon the kind of molecules )

Avogadro's Molecular Hypothesis

In early days of the atomic theory, scientists were puzzled by differences in the way equal volumes of different gases combine to make other gases For example, one volume of nitrogen (N) and one volume of oxygen (O) produce two volumes of patric oxide But one volume of nitrogen and three of hydrogen (H) produce only two volumes of ammons, whereas one volume of payen and two of hydrogen produce two volumes of water vapor In 1811, an Italian, Amedeo Avogadro, announced a brilliant theory which explained these and many other combinations a Avogadro suggested (as we state his theory today) that in any quen volume of gas, under equal conditions of temperature and pressure, the number of molecules in the volume will be the same, regardless of what kind of gas may be intoked If this were not a fact, Boyle's and Charles's laws would not hold true for all gases.

According to Avogadro e theory, gases differ in the number kind, and arrangement of the atoms which make up the molecules, but once the molecules are formed, one kind behaves like another (except for weight) in all simple gassous phenomens, so far as the temperature-pressure-volume relations are concerned This principle became known as Asogadro's hypothesis

The hypothesis arises from the fact that in most chemical elements which commonly exist as gases the atoms of each element combine with each other as molecules, and the molecules constitute the free-flying particles of the gas Examples of such molecules are those of oxygen (O2), hydrogen (H2), and nitrogen (N.) When two kinds of gas combine, the molecules of each kind break up, and the separated atoms recombine in new molecules such as water vapor (H2O). nitric oxide (NO), and emmonia (NHs)

Molecular Weights and Avogadro's Number

Using this principle, ecientists can learn comparative molecular weights of gases simply by weighing equal volumes of each gas under the same conditions For standard conditions, scientists use the average atmospheric pressure at sea level (14.7 pounds to the square meh, enough to support 760 mm of mercury in a barometer), the temperature of freezing water (9°C, or 32°F), and a standard volume of 22 4 hters (about as much as 203 empty quart milk bottles). Under these conditions, the stendard volume

THIS HUGE TANK STORES GAS

of any gas will hold about 602,000,000,000,000,000,000,000,000 (or 6.02×10<sup>23</sup>) molecules. This tremendous number is called Avogadro's number.

In a mixture of gases, the number of molecules must still be that required by Avogadro's hypothesis, as modified by temperature, pressure, and volume conditions; and the total pressure also must be the same, regardless of kind of molecule. Therefore the total pressure must be the sum of partial pressures exerted by each kind of molecule; and to contribute the right amount, molecules of each kind must fly about as though they alone occupied the entire volume (Dalton's law).

### Deviations from the General Gas Law

Dalton's law shows that in a gas, each molecule acts (except for collisions) as though no other molecules were present. Even in collisions, the molecules have heat energy enough—that is, speed of motion—to rebound from each other without tending to stick together. However, if a gas is subjected to great pressure while the temperature is lowered, the molecules commence to stick, and deviations from the general gas law begin.

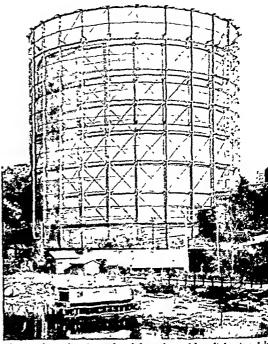
The tendency to stick together arises because each molecule is surrounded by a tiny zone of cohesive force. Increase of pressure squeezes the molecules closer together, while lowering the temperature reduces the energy with which they rebound from collisions. At length a state is reached in which the cohesive forces begin to be effective. Then some molecules are gathered into droplets, and thus vapor begins to liquefy (see Matter).

For each kind of gas there is a certain temperature above which no amount of pressure can force lique-faction. The highest temperature at which the gas will liquefy is called the *critical temperature*. The pressure required to produce liquefaction at that temperature is the *critical pressure* for the particular kind of gas.

GAS, MANUFACTURED. About 1792 a Scottish engineer named William Murdock began experiments that brought about the use of coal gas for lighting purposes. He heated coal in a kettle and used an iron tube to carry the resulting yellow gas to a tank. When he had collected enough gas he fitted the end of a tube with a silver thimble in which he had bored a small hole. Lighting the gas that escaped through the hole in the thimble, he found he had a light good enough to read by. He had a gas storage tank, a gas pipe, and a gas jet—a complete gas plant on a small scale.

By 1802 Murdock had succeeded in producing gas in sufficiently large quantities for lighting a foundry. Five years later his discovery was applied to the lighting of streets in London. American scientists who heard of Murdock's achievement followed his example. Gas was used on a small scale for street lighting in Newport. R. I., in 1806, and in 1817 Baltimore installed a system of street lighting.

Today electricity has replaced gas for lighting, but gas is still widely used for heating, cooking, and



After coal gas has been freed from impurities, it is stored in great steel cylinders such as the one shown here. The tank rests in a cistern of water and maintains a steady pressure on the gas, thus forcing it out through the mains.

for fuel and power for industries. When coal gas is manufactured today, great ovens of brick, called retorts, are filled with from 250 to 350 pounds of coal. A large gasworks may have a hundred furnaces or more, each heating from five to ten of these retorts. The retorts are tightly elosed, and the coal is roasted, producing coke and gas (see Coke). This coal gas is a mixture of substances, chiefly hydrogen, carbon monoxide, marsh gas (methane), and other hydrocarbons which burn readily. Nitrogen and carbon dioxide, which will not burn, are also present.

The gas contains many impurities, such as ammonia, tar, sulfur compounds, and water vapor. In gas plants these impurities are taken out to make a colorless, smokeless gas and a clear flame. First, the gas is passed through water, where it loses some of its tar and ammonia. It then passes through a "scrubber" and loses more tar and ammonia. Formerly the tar was not used, but today it is a valuable by-product (see Coal-Tar Products). Finally the gas passes through layers of lime or oxide of iron to remove the sulfur. Then it is held in huge storage tanks until used. These tanks are great iron cylinders closed at the top and open at the bottom. They float in cisterns of water and rise as gas is supplied and fall as gas is used. At all times the weight of the tank provides a constant pressure which forces the gas out through the mains.

For many years the flat-tip burner was the only method of using gas for lighting. Two discoveries revolutionized lighting methods and enabled the production of a much better I ght with the use of less gas One of these the Runsen hurner mixes sas and air in the proper proportion for complete combustion. This produces increased heat with an almost color less flame The other was the invention of the incandescent mantle in 1886 by Dr Karl Aver you Welshach of Vienna In the Welshach system the beht comes from a mantle heated wh te-hot in the Bursen burner The materials for these mantles come from opposite sides of the earth. Natives of India grow the Chine grass whose fiber is needed for weaving the mantles Brazil provides rare earths containing the chemical elements thorium and cerum with which the mantles are saturated. After the vegetable fiber of the China grass has been burned away a mineral skeleton" of the fabric is left which glows with a bright white light. The illuminating power of gas is meressed about three times by the use of the Welsbach mentle

Electric lighting her made the use of gas for il luminetion less important than its use as fuel. The gas range and gas furance have largely replaced the cost stoves in homes. Their chief advantages are the ease with which the heat can be turned on and oil

and their general clevillates
(As is distributed from the manufacturing plant
through main pipe usually 6 to 39 nobes in
diameter From these smaller service pipes lead to
the individual consumers where meters measure the
amount used (see Meter). The pressure in the service
pipes varies in different places from about or
the commence gause such a first about of pipes
to commence gause such a plant the use of but
pressure gas (from 10 to 20 pounds to the square
much) has been larsely advocated.

Many ettes now use a gas called 'water gas' It consists largely of bytogen and carbon monousde, made by passing steam through red hot coke or hard coal. This gas burns with a very hot blue fame but it is extremely possonous because of the high percentages of carbon monovule it contains. To make it for use as an allumnating gas it is corbureded by miving in gases such as chylene and acetylene which burn with a lumnous flance

Another gas highly useful in industrial processes in producer gas. The best quality is made by passing aut through white-hot coke although coal and even pest may be used. Blast-furnace gas generated in the operation of blast furnaces is of this type.

Radicod ears in the United States were formerly lighted by compressed Pinters gas distilled from petroleum but now electricity generated on the train is used Acetylene gas is widely used where there are no central gas works (see Acetylene) Gasoline is also used for illumination by vaporining it in a current of air in an incandescent mantle

Gas Naturas. For a long time natural gas was regarded merely as e cunosity and as a musance In Iran and India at susued from crevices in rocks and the natures kept it burning as a tribute to other fire-god. Near Baku on the Caspian Rese-mon one of the world a greatest petrolouin producing contingerare the runs of an old temple built on the site of one of these fivery jets.

The United States appearantly has the greatest wealth of natural gas. Burning springs were known in this country as early as 1775 and the first discovery of gas by driling was made in tha 19th century. Worknen borngs sait well in Ohos struck gas pocket and when the gas fiamed forth they fied errors. We have drilled through to hell:

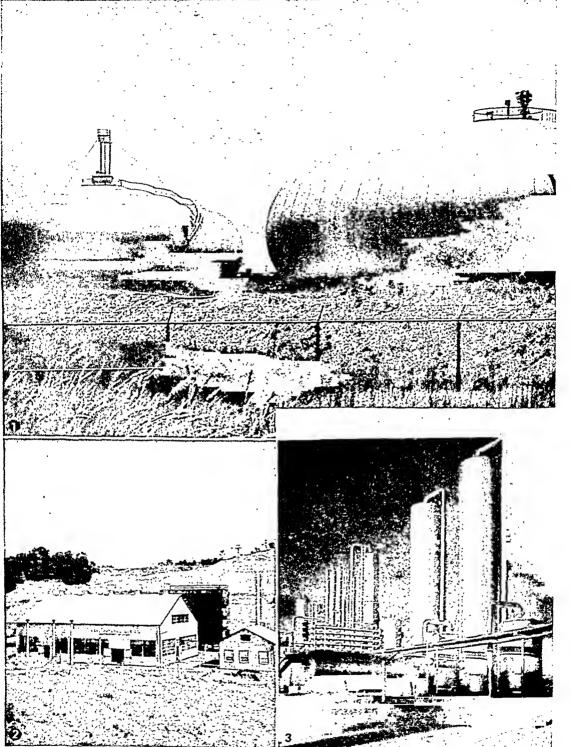
LAYING PIPE LINES FOR NATURAL GAS





fractore equ pped with side becme held sections of size for we dag fett use wences such is lowered into the t each and cover fractors equipped with side became held sections of such parties at two precises yet. Such reinforcement called line toop og with dirt. When precises yet asked to are to the such as a precise he dande water

# HEAT AND POWER FOR HOMES AND INDUSTRY



1. The natural gas in these pumpkin-shaped storage tanks is ready for use. 2. Pumping ("booster") stations are usually located about every 100 miles along a natural gas pipe line. The station increases the pressure of the gas to move it along to the consumer. 3. Absorption plants scrub natural gas from gasoline by passing it through oil which absorbs the gasoline.

In 1821 natural gas was used for highting in Picloma, N Y, but it was not until 1822 that it began to be collected and piped on a commercial scale. The beginning was made in Titusville, Ps, in the heart of the Pennsylvania oil regions. Since that time the natural gas undustry has had a tramendous growth Natural gas is used in many places to enrich the manufactured variety

Natural gas is mixture of combestible gases and apons, cheffy methane. At some places it is found alone. At others it is mixed with oil and mixet be extracted. At still others it occurs with oil but is not mixed with it. Nearly all oil fields have gas its natural reservour is prouse rock, such as a commegranted sandstone of miseasone who a covering control sandstone which keeps the gas to said keeps out any shade which keeps the gas to said keeps out any shade which keeps the gas to said keeps

In most gas felds the gas-bearing beek are arched up and the gas a secremical of the arches often above oil (see Petrojeum). Wells are sunk to depthe of 250 to 9,000 feet or more and are from two to eight inches or more in diameter. Natural gas is found mostly in the United States and in Poland, Rumanna, Russia Germany France Inche, Chang, and Japan Cate froducing conters in the United States are Okthoma, Texas, California Louisiana, Ananes, New Merco, end West Virginia.

Billions of dollars' worth of natural gas were onewasted at oil fields where great flaming with blazed unchecked for months. At one Oklahoma field, gas worth 875,000 ceapand every day for a year with only 825,000 worth of oil was collected dolly. When the great Mary Sudik NO I will broke loose on Oklahoma, 100 000 000 cube feet of gas was nasted daily for weeks before it was brought under control for weeks before it was brought under control

The problems of gas transportation are spendly being solved. The industry has come to rest that of coal, oil and electricity for producing heat and power. But long-distance pipe has are so expenditude to install that returni-gas final will probably always be more costly than coal at most places. It is avery been such convenient and millions of American homes of the company of th

use natural gas for heating cooking or both Great pipe-line systems similar to the oil pipe lines which form a network over the country, now carry natural gas from its source to far-distant communities Lines from Louisiana serve New Orleans Atlanta, Birmingham and St Louis Lines from Teves run to Denver, Chicago, Detroit Philadelphia and New York City, about 2 000 miles away West Virginia gas 19 carried to Pittsburgh and other eastern cities Weld ing of pipe joints, with expansion joints and elastic couplings, prevents leaks Hundreds of thousands of miles of pipe lines have been built and new projects are under way Compression or 'booster' stations every 100 miles along a line maintain pressure. Microwave radio links offices terminals compressor stations, and field crews for operating some lines

The storage problem is solved in part by holding the gas in its natural reservoirs until it can be used, or by storing it in abandoned gas fields 'One such

abandoned field now in such use holds six times as much gas as all the steel gas holders in the country.

A by-product of gas and of fields and of refinences in homen as LP-Gas (figurefied petroleum gas). This is bapely a metter of butten sed propane (see Hydrocarbons). It liquefies readily under pressure and is obstituted at math cars, in tank trucks and in small steel opiniders. On farms and in communities where supplies of regular gas are mistificent LP-Gas in widely used for cooking and heating. It can also be used as a tractor fuel.

Carbon black a fuffy black pigment is secured by burning natural gas beneath an ron plate. Its clared use is in making automobile times (see Rubber). The pigment is also the basis of printing ink and is used in phanograph resords paints, typewiter rid bose insulating materials art-light earloss brushes for electrical machinery and store poinh. Tenso supply over 60 per cent of the nountry's output, but carbon black is made also in West Virginia, Kentucky, Montans and Wygoning

GASOLINE. The most important single product of petroleum is gasoline. This valuable fuel custs in crude petroleum as a mature of parafilh base hydrocarbons. Each molecule has from five to ten carbon atoms, making the substance highly inflammable. This quality is vital in gasoline s role as a motor fuel.

Commercial gasoline is a blend of gasolines from three stages in the refining process. The first is natural gasoline, taken from natural gas that rises from oil selfs. Best or straight rim gasoline is one of the fractions drawn off from the fractionsting tower. The third is crocked gasoline, made by breaking down other fractions (see Petroleum).

In older automobile enguses the gazoline vapor in the cylanders was compressed to one fourth its volume before being quited. Higher compressions would give more power but could not be used, because the spore exploded to soon and "anocked." In 1922 Thomas, Midgley, Jr., and T. A. Boyd found that adding tetractival lead and eityleine bromade to gazoline permuted greater compression without knocking. "Ethyl" gasoline was first sold in 1923.

In 1300 cogmers adopted the ordine number test for rathing the anthinoic quality of fuels. Two test hydrogarbons are used. One heptane knocks violentby The other, two-ortane, can scarcely be made to knock at all. The fuel to be tested as used until it begans to knock. Then a mixture of heptane and unoctane as found which matthes the fuel in knocking. The precentage of the first The higher the ordane has been assessed to be a fuel to the containment of the fuel will stand. Refugers good pearing to improve the ordane number.

ratings of ordinary gasoline. In 1933 they arranged with the patent owners to use ethyl in ordinary grudes, provided these were kept about 5 ordinar numbers below ethyl grades. These modern fuels make possible compression ratios of more than 6 to 1 in automobiles. Aurybase engines use even higher ordinar fuels.

## LEADER OF THE FREE FRENCH



In the second World War, General de Gaulie—alone of all France's political and military leaders—inspired and directed his nation's underground resistance to the German conquerors. Here he greets admiring followers. Later he became provisional pres'dent of France.

GAULLE, CHARLES DE (born 1890). Few people outside the military circles of France and Germany knew about Gen. Charles de Gaulle before June 18, 1940. On that day he broadcast from London to the French people: "France has lost a battle, but she has not lost the war." This proud challenge launched de Gaulle into world prominence. His broadcasts helped to unify those of the French people who refused to submit to Nazi domination.

De Gaulle, a tall, austere, aloof, French soldier, assumed command of the Free French and led the resistance movement because no other leader appeared. His old friend and former commander, Marshal Henri Philippe Pétain had surrendered and had become head of the Vichy régime under German domination.

Charles de Gaulle was born at Lille, France. Although he was an active boy, eager to attempt the new and difficult, he always found time for reading. Upon graduation in 1911 as an honor student from Saint-Cyr, the West Point of France, he chose to serve in the regiment commanded by Pétain, at that time a colonel.

Fighting under Pétain in the first World War, de Gaulle was wounded twice. At Verdun in 1916 he was captured by the Germans, who took him to Magdeburg prison. With characteristic determination, he tried five times to escape but failed, and was not released until the end of the war.

For a time he taught military history at Saint-Cyr. Then he was chosen to attend the French War Academy at Paris. Later he rose to heutenant colonel and became secretary general of the Superior Council of National Defense, the highest military authority in France. While holding this position, he wrote 'The Army of the Future', explaining the necessity

for mechanizing the infantry. Most French military leaders laughed at his ideas. In Germany, however, many of his suggestions were adopted.

Early in 1940, when the Germans were again pushing into northern France, de Gaulle became a general and took command of a newly formed mechanized division. But it was too late to check the Nazi Panzer forces. On June 17, 1940, Pétain asked Hitler for peace terms. Next day de Gaulle flew to London. He went on his own responsibility, not knowing how he would be received. But Prime Minister Churchill supported him and de Gaulle built up a French army of volunteers. He kept in touch with the underground factions in France, who in 1942 united and accepted him as their leader. Snubbed by some Allied leaders, he continued to lead the Free French, later known as the Fighting French. After the American invasion of North Africa, he iomed Giraud in Algiers as co-president of the French Committee of National Liberation, later becoming sole president of the organization and chief of the armed forces.

Defying enemy snipers, de Gaulle entered Paris on the heels of the retreating Germans, Aug. 25. 1944. His avowed intention was to restore France "as a great world power." Appointed president of the provisional government, he tried to weld French political factions into a strong national regime. An ardent Catholic, he opposed extremist measures of both Communists and reactionaries. He sought a moderately liberal program embracing some socialized

experiments, such as nationalizing the Bank of France. When opponents tried to strip power from the presidency in 1946, he resigned from office.

But the new constitution plunged France into the

troubles de Gaulle had foreseen. In 1947, in an eifort to get a strong, central government, he organized a new political party, Rally of the French People. His political strength ebbed, however, in 1953 and he dissolved the party. When France was torn by political strife and unrest over the Indo-China war in 1954, aging de Gaulle hoped to be called to power. GEHRIG, HENRY LOUIS (1903-1941). On June 1 1925, a husky baseball rookie came into the New York Yankee lineup as a pinch hitter. He was Lou Gehrig. Rookie Gehrig hit a single, and so started one of the most remarkable records in baseball. From that day he played in every game, regular and exhibition, until 1939. Then a mysterious illness forced his retirement. It was finally diagnosed as a type of paralysis, and brought death two years later when Gehrig was only 37.

Gehrig was born in New York City, on June 19, 1903. His father, an iron worker, spurred Lou's interest in athletics by taking him to a gymnastic club. But just before Lou graduated from grammar school, Henry Gehrig became too ill to work. Mrs. Gehrig and Lou worked to support the family. Lou still had time for athletics at the High School of Commerce and played on several school teams. At first he was awk-

ward and uncoordinated, but he practised constantly to overcome his weaknesses. Even as a star Gehrig was the first and last man on the practising field

At Columbia University, Gehrig pitched played ortifield, and first base. In June 1923, he signed a Yankee contract and was farmed out to Hartford, Court, in the Eastern League for two seasons. Gehrig on the regular first base position with the Yankees the day following his pinch hitting are gament and played continuously until April 30 1939.

Gebing played in 2,130 consecutive games on the Yankeev regular schedule a record that still shade For this achievement sports writers nachamed him the "liron Horse." He had a lightime batting a still of 340 and was take voted the most ularshik Ameri can League player. He hat 449 home runs—in 1927—and was one of the few players in back-bill history to his four home runs more came in 1928.

he was elected to BASEBALL S baseball a Hall "IRON HORSE" of Fame In 1933 Gehrug married Eleanor Twitchell of Chicago On Oct 11 1939 he was betacacas member of the New York City parole hoard He served in this capacity until shortly before his death



Lou Gebrig alama u long live drive to deep right neld. He was left handed both at but and in the field. In the battleg order left handed both at but and in the field. In the battleg order he usually came up fourth, in the cleanup years in the tany next. He he Ruth, came up thand

GELATIN The quivering, variously colored dessert so often served with cream in a rellylike mound is a good example of one of the many uses of gelatin as a foodstiff. It is used to make puddings, rellies, soups, salads, and so forth.

Gelatin is a hard, yellowish semitransparent substance extracted from the white connective tissues bones and skins of food animals. It is a protein food of moderate nutritive value, and it helps digest other foods. Vegetable gelatins are made from Irish moss and other sawbods.

Chemically galatin is the same as give (see Glue). The bines are traited with hydrochloin and first are boiled to remove mineral matter. Crude galatin may be purified by dissolving it in but water and adding algobid. Purified with sulphurous and said other chemically, later removed it makes the tough, whitch seemitrosperact 'singliss' used in refining biguogs and stifleouse frond. Another land of sunchas so obtained from the arp biddees of fish.

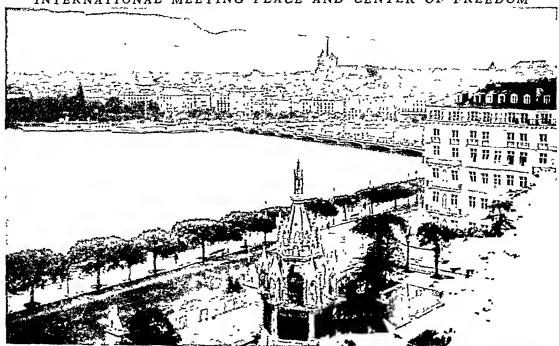
See a volume in our of contest or infant press relation as one of the ingredient of printing press relation as one of the ingredient of printing press relation as one of the ingredient of printing press dying and tentung and in making paper, as approach the pressure of the pressure of

GENEVA (Freech Genève German Genf), SWITZER-LAND Its natural advantages and its political history have made the city of Geneva a unique center of international activity and of freedom of thought

For centures the Swas have protected pringes from political and religious persecution, and many of these settled in Genera because of its convenient location informational contacts were conjugate and pleasure Genera stands at a natural "crossrods" On the west test France " to the northeast, a broad valley gives access to Germany. "To the southeast shart routes led current to Hays to Italy. The city a location on I ake Genera, for Lac Lemma) also gives it great senic charm which attracts below of towners from all eyes the world.

The whole world recognized the interpational character of the oil via 1884 by selecting it as headquarters for the International Red Cross Other organizations that etablished themselves there were the Students' Iodernational Union, the Geneva School for International Studies, and the Inter Parlamentary Union. The crowning recognition came after the first World Wit, when Geneve was chosen as the seat of the Lengue of Nations Araps. Park, on the outskirts of the city days of the city was chosen as the rile of the spacous Palace of the Lengue uniform over the United Nations the Palace and other buildings, melading the history donated by John D Rockelburg and only the Palace and other buildings, melading the history donated by John D Rockelburg or the Control of th

## INTERNATIONAL MEETING PLACE AND CENTER OF FREEDOM



This is the heart of Geneva. The lovely Swiss city has been noted for centuries as a refinge for the persecuted and as a seat of international activity. We are looking across the southwestern tip of Lake Geneva at the point where the Rhone River flows out of it, cutting the city in two. At the left is the yacht hasin and the bridge is the Point du Mont Blanc. The mountains in the background form part of the Mont Blanc chain.

Various specialized agencies of the United Nations and other international organizations have their head-quarters in this large, handsome structure. The International Labor Office Building on Lake Geneva was transferred to the International Labor Organization. (See League of Nations.)

During the Reformation, Geneva was known as the "Rome of Protestantism." John Calvin made his

headquarters here from 1536 until his death. Calvin practically ruled the city and gathered about him many other Protestant reformers (see Calvin).

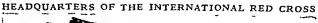
In 1559 Calvin founded an academy which became part of the University of Geneva in 1873. For many years the city has been noted as a cultural center. Voltaire lived for years at near-by Ferney. When Napoleon rose to power, his bitter enemy, Madame de Staēl, established her

famous salon in a château on the north side of the lake, at Coppet. Everything here remains just as she left it, and today the château attracts many visitors.

Tree-lined promenades and luvurious tourist hotels surround the lake in Geneva. The city has beautiful university buildings, and magnificent palaces house the international organizations. Snow-clad Mont

Blane, 40 miles to the southeast, tops nearby Alpine peaks. Manufactures include watches, jewelry, instruments, machinery, and chocolate. (See also Switzerland.) Population (1950 census), 145,473.

Lake Geneva, 45 miles long and 9 miles wide, is the largest lake in Switzerland. At the other end from the city of Geneva, near Montreux, is the Castle of Chillon, made famous by Byron's poem, 'The Prisoner of Chillon'.





Rational Red Cross societies communicate through their international committee here. During wars it is the clearinghouse for information on war prisoners. It handles their mail, inspects camps, and arranges exchanges.

GENGHIS (\$\delta'\dagger'dis) KHAN (1162 1227) From the high wind-swent Gobi Desert came one of the world a great warners. He was Genghis Khan a Mengohan nomad With his fierce hard riding nomad herde he conquered an empire that stretched

through Asia from the China Sea to the Black Sea This huge realm was greater in size than all North Amer ica (See also Mongols )

Genchis Khan was born on the Gobi Desert in a wurt (felt tent) on the bank of the Onon River in northern Mongolia His father Yesukas was chief of several tribes and had nest tion a fee named Temuum. In to umph Yesukai named his new bern son Temuin

Yesukai died when Teminin was 13 years old The boy became chief But the fierce restless nomada would not obey so young a ch eftain The chief of snother tribe proclaimed himself leader of the Mongols and captured Temuum Guards forced Temuum into a kang a wooden yoke that shackled his shoulders and wrists. But in the dark of night Temuum slowly twisted himself to much above a guard and smashed the kang down on his head Leaping over

him Temujin raced to the river pushed into the reeds and crouched in water up to his chin to hide

Temuin a bold courage and resourcefulness began to win followers When he grew to manhood he con quered the Tatars and joined them to his tribes. In 1203 he defeated the Keraits Seizing their cities of mud and atone he made Karakonum his conital In 1206 a council of his tribes named him ' Genghis

Khan It meant Greatest of Rulers Emperor of All Men Genghis Khan then put all his KHAN Mongolian realm under Yassa a body of laws he assembled from various tribal codes Tlese laws demanded obedience to Genghis Khan unity of the tribes and muless numshment of

> welded his wild tribesmen into merciices successful armies On his march of conquest Genebis Khan overran Cathay or north Chine in 1208 15 Wheeling westward his horde conquered Turkestan Then his armies engulfed he abboring countries even part of Ind a In 1222 the Mon gols struck into Europe at the Don River After defeating the Russ ana they pushed to the Dnieper Victor ious Genghis Khan returned east. At his death his empire passed to his sona. GENOA ITALY The beauty loving

> wrongdoers Yassa enabled Genghis

Shan to achieve the discipline that

Italians call Genoa La Superba — The Proud Rising from the Guli of Genoa in white rehel against the sharp slopes of the

Apennines it is a magnificent sight. Along its steep streets are superh medieval churches and ornate marble palaces of Renaissance times Proud too is the city a heritage for Genoese mariners made some of the boldest voyages of discovery and conquest



And here, at the harbor edge, the young Christopher Columbus dreamed of faraway lands.

Since the Middle Ages Genoa has been a thriving port, for it is one of Italy's few outlets on the west coast. This situation later became an enormous advantage when the tide of commerce turned westward, for it lay nearer the Atlantic than its old rival Venice. Today Genoa is Italy's chief port and the gateway to

the great northern plains which are the heart of the nation's agriculture and industry. Linked to Switzerland by the great Simplon and St. Gotthard tunnels, it handles much of the bulky imports destined for the Swiss nation and for southern Germany. With its warehouses, storage tanks, foundries and shipyards, it is a bulwark of Italy's industry. Hence, during the second World War, it was bomharded from the sea and the air hy the Allied forces.

The city has an eventful history. Both the Lombards and Franks once held it, but, when Charlemagne's empire broke up, it became an independent city. It fought a long series of wars with Pisa, its southern neighbor, in which the latter was crushed in 1284.

Genoa's foreign trade and maritime power increased greatly during the Crusades. It had colonies in Spain and North Africa, conquered from the Saracens, and trading posts and fortresses in the eastern Mediterranean and along the Black Sea. Its commercial rivalry with Venice led to a series of wars that ended with Genoa's defeat at Chioggia in 1380. Its eastern trade never recovered from this hlow.

Many of Genoa's noted mariners, turning elsewhere for ships, entered exploring expeditions sent out by foreign monarchs. The most famous Genoese discoverers were Columbus and the Cahots.

The aristocratic and democratic factions in Genoa were in constant turmoil up to the 16th century, when the autocratic rule of the doges began. The famous Bank of St. George was founded in the 12th century. In the Middle Ages this small group of merchant capitalists virtually dictated laws and gave orders to the government.

Genoa's historic wealth is reflected today in imposing churches, palaces, schools, libraries, and mu-

seums. Its university was founded in 1471. Corsica, the last of the city's foreign possessions, revolted and was taken by France in 1768. Sardinia-Piedmont acquired the city in 1815, and it became a part of the kingdom of Italy with the union of the peninsula. Population (1951 census, preliminary), 678,200. GENTIAN (gĕn'shŭn). When autumn leaves are

GENTIAN (gĕn'shŭn). When autumn leaves are turning gold and red, the lovely gentians open their

sky-blue blossoms. They grow in moist woods and meadows and along the banks of streams. The exquisite beauty of the fringed gentian made it a victim of flower hunters, and it is now one of the rarest of all wild flowers. The bottle, or closed, gentian is also becoming very scarce. These flowers should never be gathered even for transplanting. Only the expert can make them grow in gardens.

The fringed gentian is found from Quebec to Georgia and west to the Dakotas and Iowa. The flowers are vase or funnel shaped and are about two inches hroad. The four violetblue petals are delicately fringed. This is a device of nature to keep ants out of the nectar at the base of the vase. The blossoms grow singly at the top of an erect stem one to two feet high. (For illustration in color, see Flowers.)

The bottle, or closed, gentian looks like a cluster of six or eight blue bottles at the top of the stem. They are set in the bases of the upper pair of leaves. Only the big bumble-hees can force their way into the tightly closed petals and reach the nectar.

In the mountainous parts of the United States, there are many other gentians, with

flowers of blue, purple, white, or pale yellow. The dried roots of the European yellow gentian yield a drug, which is also called gentian. It is used as a tonic to improve digestive action. The flower is named in honor of Gentius, a king of ancient Illyria, because he is said to have discovered the medicinal value of the plant.

Gentians form the genus Gentiana of the family Gentianaceae. There are more than 300 species in the northern hemisphere, about 70 of them in the United States. Scientific name of fringed gentian, Gentiana crinta; closed, or bottle, gentian, Gentiana Andrewsii; soapwort gentian Gentiana saponaria; yellow gentian, Gentiana lutea.



At the top, the fringed gentian opens its bell-like blossoms. Bottle gentians and soapwort gentians bear the lighter blue closed flowers pictured below.

## GEOGRAPHY-Studying the EARTH as MAN'S Home

EOGRAPHY Throughout the ages man and nature have been writing a story on the face of the earth The story is ever changing It will never be finished as long as the waters keep wearing away the hills and men continue to build cities and clear wood land for the plaw It fascinates those who know how to read it and it is vital to all mankind

The science of geography deals with this story The word geography comes from Greek terms meaning the earth' and to write Geography describes the landscape which natural forces and the work of man have created It brings out the interrelation sh as between men and their surround

ings or environment

It explains how people are influenced in the way they live and work and play by the kinds of land and water air rainfall and sunshine that surround them It reveals the part men s own talents ambitions and imitations play in using and developing the land scape and its resources. It helps peoples to understand one another because we can appreciate others only when we stand in their shoes and face the r problems

Reading the Geography Story People begin as children to read the story man and nature have written on the face of the earth A boy learns his way home from school by observing

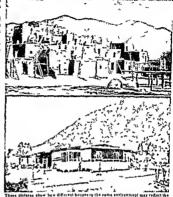
the streets and buildings in his home town or the hille and streams of a farm landscape. In the city he finds that some buildings are stores others homes or apartments and still others are factories or churches The railways with their speeding trains and the highways crowded with cars fasemate him He comes to understand that they tie his town to ne gliboring cit es and to the side world beyond

The adult reads the geography story wlenever he travels. When he awakens after an overnight train trip he looks at the landscape to locate himself. As he goes along by day he not ces whether the estres are large or small and whether the hard is level or mountainous He may be interested in the kinds of in dustries the varieties of trees plants and animals and the type of houses people build

Exploring by Travel and by Using Books

who enters an unknown land makes these observations and many more He tres to learn what the natural en vironment provides for the people and how they have used their advantages and overcome their handwaps

THE GEOGRAPHIC explorer



How do they provide the r food at elter and clothing? Do they trade with other peoples to get goods they cannot make at home? Have they created a just and sound government? Do they have schools churches books art works and other things that earth their lives? After gathering the facts the geographer fits them together. He attempts to reach an understanding of the special character or personality which the works of man and nature together g ve the region

The student of geography makes the same observations as the explorer He does not do so by traveling over the globe Instead he uses books princles mans and pictures. He sees that places and peoples are different in many ways and he tries to find reasons for the d fferences he d scovers

Different Dwellings around the World

Differences in kinds of houses are easily observed whether the student travels or uses pictures. Even within the United States many contrasts are apparent Frame houses are abundant in this land where widespread forests have provided a plentiful supply of humber But in large crowded c tes there is not enough land to permit building a dwelling for every



All over the earth people seek to make the hest use of their land. Here we see a mountainous ares in the Georgian Soviet Socialist Republic. Much of the land is too rugged for farming, but sheep will fatten on the grassy slopes. A shepherd is during his flock to high pasture after the mountain snows have melted in spring. They are crossing a Georgian military road.

family. Huge apartment buildings, many stories high, are built of brick, stone, or concrete. They provide homes for most of the people in these congested centers.

Other kinds of housing can be seen in regions where little or no timber grows. The Indians of the arid Southwest use sun-dried brick for their adobe houses and pueblos Early settlers in the nearly treeless Great Plains lived in sod houses until they could buy and transport lumber.

Around the world even more striking contrasts appear. In the Swiss Alps, picturesque farm houses of stone and wood have steep, shingled roofs to throw off the abundant rain and heavy snow. In dry, sunny Greece, thick stone house walls support roofs that are nearly flat. The pastoral folk of Africa's vast northern desert pitch tent dwellings as they wander about seeking grass for their flocks. In the villages built around the water holes, the flat-roofed houses have thick walls of sun-dried brick and narrow windows.

To the south in the rain-drenched Congo forests, the people build steep, sloping roofs by fastening long poles together at the top and covering them with mats woven of long, narrow palm leaves. Saplings are lashed together and daubed with clay to make walls. On tropical islands of the South Pacific, the people use bamboo stems and palm leaves to build thatched "stilt houses." These airy dwellings may be lifted on poles above the sea or above the moist jungle

growth. (For examples of these and other types of dwelling, see the entry Shelter in the FACT-INDEX.)

Differences in Use of the Land

Differences can also be seen in the way the land is used. A huge portion of the earth's land is used for farming. There are endless kinds of farms, and even the same kind may differ in two places. In Wisconsin, fine pastures and large barns with huge silos suggest the importance of dairy farming. In Oregon, where cattle find pasture throughout the year, dairy farms seldom need large barns or silos

Iowa's huge farms have broad aeres of eorn, stock pens, big barns, corn cribs, and other buildings. Tractors, corn pickers, and other modern farm equipment show that the farmers have the advantage of using machines to cultivate and harvest their crops. Grain and livestock farms in the Danube basin of Europe differ greatly from these modern American farms. Striking differences can be seen in the homes and even more in the amount of machinery in use.

The French vineyards, the Chinese rice paddies, the Brazilian coffee fazendas, the Mexican haciendas, the

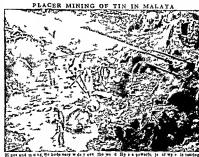
Brazulian coffee fazendas, the Mexican haciendas, the Argentine estancias, the rubber plantations of New Guinea, the pineapple fields of Hawaii, the Cuban sugar plantations, and the citrus groves of California are other noticeable types. They show different ways in which people use farmlands in different environments (For pictures of various types of farms, see articles on the states and countries mentioned.)

Lands used for gras ng offer contrasts with oult vated lands. Usually they are too rough for the plow or the cf mate is too cold or too dry for cross Various grax ng lands df fer from one another too Cattle ranching in the highlands of northern Mex co has Ittle in common with redder grazing as care ed on by the Lapps of Norway.

#### Industrial Uses of the Land

Where the carth yields valuable minerals people find it profitable to use the land for ming. Con trasting types of mining melude the open p ts of the Lake Super or iron ranges the bitumnous coal mines in the Appalachan fields and placer mining for tim in Malays

People engage in logging and lumbering where they find forested land—provided of course that they can transport the logs end lumber to market at a profit Logging and lumbe ag methods differ with var et eo of timber and land surface Logging of great Doughas firs in the Pacific horthwest-cills for methods



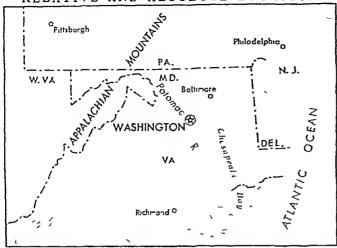
different from those used in cutting pulpwood in Canada or in the pine forests of the South

Thousands of different manufacturing industries are scattered over the world's lands. They vary for primit we hand crafts such as basketmaking and simple processing of raw materials is canning fruits.

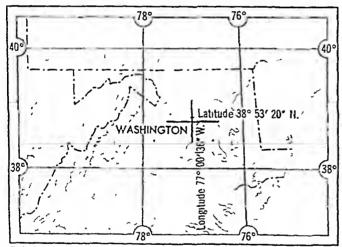


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# RELATIVE AND ABSOLUTE LOCATION



A student can locate Washington, D. C., in relation to many natural and political features on this map. He sees at once that it is east of the Appalachans and not far from the Atlantic. It is situated on the Potomac River, on the borders of Virginia and Maryland, and on several railway trunk lines. It is southwest of Baltimore, southeast of Pittsburgh, and north of Richmond.



Relative location is enough for many putposes. But a navigator who must know the exact location of a place needs a map or a latitude and lougitude table. Knowing the latitude helps him understand the climate of an area.

to complex operations calling for skilled workmanship and intricate machinery. The observer learns to distinguish between industrics by noticing how they differ in appearance. He sees that the textile mills of New England differ from the iron-and-steel plants of the lower Great Lakes area. The pottery towns of England are unlike the watchmaking villages of Switzerland or the glassmaking centers of Czechoslovakia.

By observing the surroundings he can sometimes find out what conditions led the people of a region to specialize in a certain industry. For instance, he sees Great Lakes iron-ore boats unloading at a Cleveland iron-and-steel mill and long trains of coal cars arriving from the mines of near-by Pennsylvania. This leads him to decide that convenient supplies of raw ma-

terials was a factor in the location of the iron-and-steel industry in Cleveland.

The world's cities differ too. Manufacturing cities differ from commercial centers, from cultural or political cities, and from ports. There are various types of each. The port of New York, with its long piers built out into the harbor waters, contrasts with the port of Los Angeles, with its man-made harbors. New Orleans, with its wharves and warehouses along the Mississippi River, differs from the Great Lakes ports.

The more striking differences in land use are soon recognized by the geography student. A keen observer also notes contrasts in methods of work, in tools and equipment, in the success with which the land is occupied, and in what is done with the produce. Through these observations, he gains insight into the people's abilities and stages of development.

Differences due to political and social causes are usually more difficult to discern. In general, free peoples who live under a democratic government show evidence of a high standard of living and efficient use of the land. In contrast is the backwardness evident among colonial peoples, such as those of the Belgian Congo and of many Pacific islands.

## Understanding the Natural Environment

THE GEOGRAPHY student-explorer observes and

learns many things about the elements of the natural environment. An accurate knowledge of location is necessary to a correct consideration of a region. Relative location involves the position of one place or thing in relation to others—as the location of a city with respect to mountains, plains, waterways, railroads, highways, air lines and the like. Exact location is the position of a place with reference to two global orientation

lines—the equator and the prime meridian (see Latitude and Longitude). A position 40° N. and 80° W. places the location exactly.

Exact locations tell many facts. Latitude 40° N. means that the place is 2,800 miles north of the equator, since a degree of latitude covers about 70 miles. Herc June is a summer month. The days are almost 15 hours long and the noon sun appears high in the key. December is a winter month. The days are only about 9 hours long and the noon sun is low. Longitude tells the distance around the earth and indicates time zones. Longitude 80° W. means the place is 80 degrees west of the meridian of Greenwich. Counting 53 miles to the degree, this is about 4,240 miles. It is only 7:00 a.m. here when it is noon at Greenwich.

Altıtude (elevation above sea level) is another factor of location The explorer may find a marker set by a government surveyor which tells the elevation of a place Or he may have a harometer or altimeter to measure the altitude (see Barometer) Usually he has to depend upon a map or other source for this data

The land forms, or surface and relief of a region are important for understanding the human activi ties there They also bein to explain other elements of the natural environment, especially the climate In studying the land forms, the geographer notes the obvious differences between plams plateaus mounand valleys (see Earth) He elso

seeks to measure the irregularities within a generally flat or generally mountainous area—the steepness of the slopes or the width of a valley for instance

#### Climate and Its I ffects

The climate of a region affects the land forms and the soils and accounts in large measure for the plant and animal life (see Chmate) It also makes a diference in the ways people live The explorer can discover certain things about the climate by observing evidences of chmate's work on the landscape For more accurate information he depends upon chimatic records Such records may be averages of temperature precipitation, pressure humidity wind and the like over a period of many years. But averages may be deceiving. The student usually wants to know how hot it gets, how many months are hot (above 68° F), how many are cold (below 32° F) how much it rains, when it rains and what is the prevailing wind direction With this information he can tell for instance, whether the climate is hot and wet like that of the Amazon, or mild and ramy in winter and hot and dry in summer, like that of the Mediterranean area. Resources of Soil and Water

Soils differ in color, texture, structure, and chemical composition from place to place (see Soil). The goog rapher identifies the types of soil in order to understand the people's use of their lind. In hot, wet Linds, such as the tropical Congo forests he finds reddish

A RIVER AND THE ALLUVIAL SOIL IT BUILDS

So I and water are two important features in the natural environment. Here we see the minds Mississippi and ber de it thiswing exchards and farms on the rich deep alluvial water burns, soil if his

soils known as laterates. They are generally infertale because the heavy rain has leached away the plant food. Near by he may see more fertile soils deposited by overflowing streams called alluvial soils, or he may find rich lava soil which has been erupted from voleances (see Voleances).

Water supply exerts a vital influence on the en surpament. Navigable rivers and lakes such as the Great Lakes-St Lawrence system in North America and the Rhine River in Europe aid in the development of their territory Egypt with its Nile River for muration contrasts sharply with Libya-a desert without a Nile Cities on the Great Lakes enjoy a relatively chesp and abundant municipal water supply Other cities such as Los Angeles must spend millions bringing water to their mains. The level of the underground water table vames over the earth It is readily tapped by wells in most of the United States. In parts of France on the other hand the location of villages may depend upon the site at which well drillers are able to reach the unusually low water table The recrestional resources of a region are augmented by the availability of lakes rivers, and seas. Flood hazards may make water a scourge instead of a benefit to an area (see also Water)

The occur influences both human activities and natural elements in the environment. It affects the temperature and rainfall of surrounding lands and plays an important rôle in transportation, foreign trade, fisheries, and other affairs of man.

Plants, Animals, and Minerals

Plant life and animal life vary from place to place according to the temperature, rainfall, soil, and land surface (see Ecology). In the tropical rain forest, the dense canopy of leaves discourages undergrowth. But insects and tree-dwelling animals such as birds and monkeys are abundant. In a savanna, luxuriant tall grass provides animal food, and scattered bushes and trees offer shade. There large grazing animals prevail. Elephants, rhinoceroses, girafies, buffaloes, and numerous smaller animals wander over the African savanna, while lions, leopards, hyenas, and other meat eaters prey on the grazing beasts. Lumbermen, hunters, and trappers depend directly upon the natural vegetation and animal life.

Farmers gain their livelihood from plants and animals that have been domesticated. The natural growth aids them in determining which kinds of crops or livestock will flourish in a region.

Regions vary in the nature and amount of their mineral endowment. The presence of valuable minerals may be the most significant reason for an area's development. The exhaustion of the minerals may lead to a region's economic decay. The discovery of gold in Colorado led people to settle the state; but today only "ghost towns" are left to show where some of the early mines produced millions.

Relations of Man and Nature As THE geographer studies differences between regions, he recognizes the relationships between the people's activities and their surroundings. He sees

that the climate, land forms, water supply, minerals, and other natural elements influenced the manner in which people developed their home regions.

For instance, the cold climate and short growing season of northern Norway limit the amount and kind of farming the people can do. But the presence of the sea and rich fishing banks near by give them an opportunity to develop fisheries. The article on Norway shows how the able, hardy Norwegians have made efficient use of their resources of land and sea.

Overcoming Natural Handicaps

Though the natural environment plays an important rôle in the people's adjustments, it does not determine (control) them. The final decision belongs to the people and depends upon their abilities and assets.

Primitive people are, on the whole, sharply restricted by environment. But as men rise in the scale of civilization they find ways and means to overcome many of its limitations. Technical knowledge and skills enable them to use its resources to the fullest—mining metals and coal to manufacture needed goods, cultivating and fertilizing soil to improve the food supply, bridging streams, and draining swamps.

High mountains have usually isolated peoples and served as barriers to travel and communication. But the American people have cut through or tunneled under mountain obstacles to build railways, highways, and communication lines. Thus they helped to link the country into one united nation.

Scanty rainfall everywhere serves as a hindrance to agriculture. In many lands the people have sought to overcome this handicap with irrigation. One people, however, will merely dig ditches to bring the water of a stream to adjacent fields. Another will build a huge dam to impound flood waters of a great river and construct miles of channels to spread the waters over thousands of distant acres. Engineering ability and available capital are factors contributing to these differences.

### Endowments of Skill and Resources

Human factors are thus often more significant than natural elements in a region's development. These factors include the nature of the people—their insights, their skills, and their habits; their cultural background or heritage; their education, technical and scientific attainments, capital, and economic, political, and religious systems.

Great Britain did not become a great nation merely because it was situated on an island with easy access to the sea. The people of other islands, Iceland for example, have not become world powers. Neither did other natural advantages such as coal resources or fine harbors determine the island's destiny. People with abilities, skills, insights, and initiative, who saw how to make use of the favorable aspects in the environment and to cope with the unfavorable, played a more important rôle.

Decisions reached by men rather than a specially favorable environment helped to make Akron the rubber capital of the world. Akron's location in northeastern Ohio on the old Ohio and Erie Canal was favorable for transporting coal. A good water supply was offered by near-by lakes. Other places had these advantages. In Akron, however, Benjamin F. Goodrich found men with money, which they were willing to invest in the new industry, when he moved his rubber factory west in 1868. Available capital and the early start helped in the city's growth, though steep slopes and narrow valleys of the site handicapped expansion.

Kinds of Geographic Study A GEOGRAPHER investigates and analyzes the story which men and nature together have written on the face of the earth in either of two ways. One

approach is called systematic geography. It keeps the entire earth in view while investigating a single element in the complex, or man-land association. Such an element might be the earth's land forms, its climates. its agricultural characteristics, or its political divisions.

The other approach is called regional geography. It focuses attention upon a particular unit-area of the earth—that is, a region. Within the region it investigates those man-land associations which give the region its distinctive geographic character.

Subdivisions of Systematic Geography

Systematic geography when focused on the natural environment brings out similarities in natural phenom-

ena between widely separated parts of the earth Analysis of the physical features of the landscape the land forms climates waters soils min eral resources and the like is called physical geography Certain aspects of this field in turn are sometimes studied separately as geography of land geography of soils plant geog raphy and similar fields of investi gation. One specialty which treats mathematically the forms size and movements of the earth is called mathematical geograph;

On the other hand systematic geography when centered on some aspect of the man made or cultural environment brings out man made similarities between faraway parts of the earth Analysis of man's occu pations as they are distributed in the world is a bass for the study of economic geography In this field there are such specialties as comp er cial geography geography of agricul-

ture and of manufacturing

Political geography emphasizes the pattern of the earth s political sov ereignties Boundaries and their s g mificance are one of its topics Cul tural geography or human geography which includes various aspects of human life is another branch of systematic geography. One of its phases is called the ecography of education This study arms to ans-

lyze and characterize education in different parts of the world as one element or pattern in the geog raphy of the world

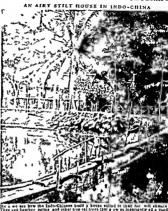
Subdivisions of Regional Geography

In regional geography analys a is concentrated on the whole man land association of un t-areas of vary ing size The unit-areas may be continental in size or subdivided into subcontinental units frequently based on political divisions such as countries states counties and the like Subd visions of the world on the basis of similarities of human life or of a specific natural phenomenon are studied from the regional approach focusing attention on the total gen-

graphic complex (see World)

A specialized field of reg onal geographic investi gation known as urban geography is devoted to an alyzing the characteristics of cities. Analysis of man land associations of the past or sequent occupance in specific unit-areas is referred to as historical goog raphy In any region an investigation may be con centrated on some specific natural or cultural element as part of the whole geographic complex of that

unit-area Carlography which is the recording in map integrate of facts of geography is on the fringe of rather than



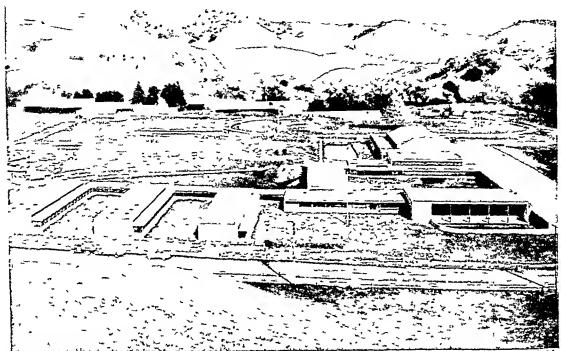
a kind of geography Sim larly geographers are much concerned with the conservat on of natural resources city and regional planning, and the like but these subjects cannot be lated as kinds of geography Other related sciences are climatology, meteorology, nuperalogy and the like

History of Phoenician traders were the first to Geography gather geographic information on sav considerable scale. They left no recands known to us but the ancient Greeks probably drew upon Phoenician knowledge as well as their own discoveres for making the first geographic studies

which entered into the body of later knowledge Like all early peoples the Greeks were interested largely in the odd and different aspects of other lands But their ph losophers realized that the earth is round and Arretotle among others codified the knowledge of their day Eratosthenes and Ripparchus developed the use of reference circles into the forerunner of modern latitude and longitude

The Romans were interested in geographic oddities and they wanted also to know the resources of the lands they conquered About the time of Christ, Strabo supplied a mine of such information about the

# EDUCATIONAL USE OF CALIFORNIA'S FERTILE VALLEY LAND



The American people use thousands of acres of fine land for educational purposes. This large, rural high school at Lafayette, Calif., provides a baseball diamond and a combination track and football field, a gymnasium, workshops, and cafeteria, as well as many comfortable well-lighted classrooms.

Empire and known parts of Asia in a voluminous work. In the 2d century after Christ, Ptolemy compiled a scholarly study of the earth in a carefully prepared eight-book work (see Ptolemy). This book became the standard authority during the Middle Ages.

Birth of Modern Geography

Scholarly interest in geography languished during the Middle Ages, but the scientific spirit was rekindled in the Age of Discovery. The voyages of Columbus, Magellan, and others provided new understanding of the earth; and every voyage added more information about the features and peoples of faraway lands European rulers competed eagerly in sending out exploring and colonizing expeditions.

Two classes of problems faced scientists and practical mariners alike. They needed, first, to acquire accurate knowledge of the size of the earth, its figure, and the exact location of seas, capes, harbors, and the like. Second, they sought to learn about the resources of the new lands that were being opened. The seamen wanted this information because they must be able to find food, water, and good anchorages. Rulers were eager to know the possibilities for exploiting the new lands they had claimed. History sections in the articles Earth, Navigation, Longitude, and Maps trace the progress made in understanding the

earth and in mapping the lands and navigating the seas during the 16th, 17th, and 18th centuries

By 1800 the outlines of the continents and islands were familiar, but three-quarters of the land area remained to be explored. During the 19th and early 20th centuries, the blank areas on the maps gradually filled. The invention of the airplane helped explorers in reaching, photographing, and mapping isolated tropical jungles and icy polar regions (see Exploration; Polar Exploration).

Development of Geographic Studies

Present-day methods of geographic study began to take form early in the 19th century. Scholars sought to organize the accumulated mass of knowledge about the earth and its natural and human features. They inquired into the reasons for the phenomena that had been observed and brought out relationships between the various elements.

German scholars led in this work. Karl Ritter and Alexander von Humboldt are regarded as the fathers of the modern science. Ritter, a professor of geography at the University of Berlin, worked to organize the available observations on the various areas of the earth. His special interest was the influence of land and climate on human activities and history. His material was so extensive that he was able to

cover only Africa and As a in the 21 volumes of his work Erdkunde (Earth Science)

Humboldt was a great geographic explorer On his tr ps to tropical America and central Asia he brought back explanatory descriptions of Ittle known areas that are still valuable to geographers. In each area he studied the relations between different elements in the Lindscape—notably between plants and the ch mate the relief the soil the animals and human be nes In his book Kosmos he sought to establish the unity of all nature

In the latter part of the 19th century a school of geographers arose in Germany and America wlo special zed in physical geography Leaders in this movement were William Morns Davi an Amer can professor who taught in Berlin an l Pars and Al brecht Penck of the University of Berlin, who taught at Yale and Columbia universities. In contrast to them were students of human geograph; led by Frie drich Ratzel H s book Anthropogeographie atuded the natural conditions of the earth in the r relations to human culture. His student Ellen C Semple epread his views to American geographers in her book Influences of Geographic Environment

Another trend emphas zed the development of re gional geography Two French geographers Vidal de La Blache and Jean Brunhes were influential in the regional field They urged the intensive study of small areas in order to provide a base for the understan ing of larger regions

Geography Associations and Publications

As geography departments have become increasing ly important in American universities associations have been formed to encourage geographic research They include the American Geographical Society founded in 1852 which publishes the Geographical Re men the National Geographic Society incorporated in 1888 which gives wade circulation to its National Geographic Magazine the Association of American Geographers founded in 1903 which publishes research papers n ats Annals and the National Council of Geography Teachers which ed to the Journal of Geography

Ther knowledge techniques and skills have made the services of trained geographers valuable in many fields The Department of the Interior the Department of Agriculture and other agences of the federal government have geographers on the r staffs Geog raphers in the Department of State furnish diplomats and consuls with surveys of the foreign lands with ah ch they des! Geographers aid with nat onal state regional and city planning projects During the two World Wars geographere served their country on such apencies as the Army Man Service the Office of Strateg c Services the Board of Geographic Names and in military and naval intelligence

### THE FOLLOWING outline presents material for the study of systemat c geography under two subd visions phy wat

geography and human geography For deta led study of reg onal geography see the Reference-Outlines for the continents and principal countries

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# How GEOLOGY Reads Earth History in ROCKS

FOLOGY All through the ages men have asked questions about the nature of the earth Why does it have so many kinds of rocks and why are they so different? What made the mountains and how old are they? Why are oil coal prop and gold found in some localities and not in others?

Until very recent times men could only guess at the answers. Even today no one can do better with some of these questions but for most of them we can obtain answers from the science of geology

#### Beginnings of the Earth & Story

Geologists tell us for example that the earth started as a huge globe of white-hot ess flung out from the sun and spinning in space. Immediately the plone started to cool and a sol d crust formed over

the surface. The hot interior however kept shatter ing the crust with convulsions and explosions The explosions threw out gases and steam and these became the atmosphere and the waters of the earth Meantime as the materals in the crust and in the depth's continued to enol they f mel n to tie



array of minerals and rocks which we find in the earth tuday

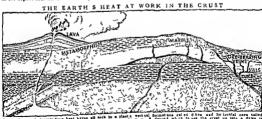
This much of the carth a h story is largely theory because no one really knows how so tremendous a mass of hot gas would cool But after the crust became cool and solid the rocks in it were subjected to forces which we do un derstand and by the for mations of the rocks geol og sts can trace fairly well what happened

#### Remolding the Court with fleat and Fice

Many traceable changes were made by the same force (called impeous activity) which first shared the earth intense heat in the depths below the crust How this force works can be seen in an active volcano

nmoke and steam pour from the crater adding gaves to the atmosphere

and water (when the steam onder on to the said and lakes Ashes stream out settle somewhere and english ute to the soil Perhaps red hot lava pours out rolls down a slope and cools into rock. In the dept! s around the volcano molten rock works between laters in the older formations and cools into new



se may girude es we i

so heat fom sptrud together may change | mestone

SOME OF THE EARTH'S OLDEST ROCK



When the earth was still young, alternate heds of limestone and gneiss were laid down in Ontario, Canada. Intense heat and pressure metamorphosed the beds into the banded, dense rock called schist which we see here. This rock has resisted change through the long ages.

deposits of igneous rock. (The word igneous is from the Latin ignis, meaning "fire.")

Interior heat also produces changes without breaking through. At times it causes parts of the crust to bend upward, somewhat like a bubble forming on a boiling liquid. At other times it melts away some of the lower crust, letting the surface sink. Occasionally, under stress from these movements, the crust wrinkles or breaks. The wrinkles constitute mountain ranges. The breaks cause shocks which we call earthquakes, and these may change the face of the land.

Tearing Down and Building Up
While igneous activity reworks the crust from below,
the atmosphere and the waters of the earth attack it
from above, tearing down material from the higher
places and depositing it at lower levels.

SEDIMENTARY ROCKS LIE LAYER UPON LAYER



Ages ago, in the days of the dinosaurs, mind and sand were deposited alternately near the present town of Cisco, Utah. These sediments hardened into the layers of shale and sandstone shown here.

The process of tearing down, called weathering or erosion, can be seen actively at work in most mountain valleys. Rain and perhaps snow and ice wear away the rocks. Winds hurl grit and dust at the mountains, wearing away more material. And water and wind together dissolve many kinds of rock.

In time all these processes, working together, tear down the tallest mountains, and the worn-away material is carried by streams and rivers to lower levels. The streams and rivers also contribute to the work of destruction by cutting at their banks. Even flat fields can be worn down or cut with gullies and stream beds when heavy rains fall and when the melted snow and ice of winter flow away. (See also Soil.)

## How Flowing Water Builds Land

Streams and rivers can build up, however, as well as tear down. When streams flow down mountains or other steep slopes, they can carry with them mud and sand, and even roll pebbles and boulders along. When the

slopes become gentler and the rush of water slows down, the heavier materials drop to the bottom. When the water enters the ocean, contact with salt water precipitates the finest material, called silt. The deposit may form a delta, or ocean currents may carry the material far and wide over the ocean bottom.

Eventually all mountains are worn down, their material is deposited on the lowlands or carried out to sea, and not enough slope is left anywhere to produce active currents of water. This flat state is called a *peneplain*; and it lasts until some disturbance deep within the earth lifts up a portion of the region, and the whole process starts again.

## The Work of Living Organisms

All these changes are the work of lifeless forces; but from the instant life appeared on the earth liv-

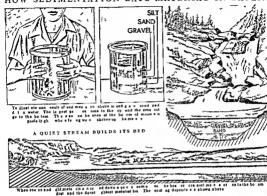
ing creatures contributed their share. Bacteria and later lowly lichens and mosses grew on rocks and broke them down into soil. When higher plants appeared they caused similar changes. In some places swamp-dwelling plants were buried and became deposits of coal. Elsewhere, animal remains formed petroleum.

The greatest contributions were made, however, by the tiny shell animals which lived wherever shallow seas spread over low parts of continents. As countless billions of the creatures died in these seas, their remains fell to the bottom and formed limy ooze. This gradually hardened into rock.

### Sedimentary and Metamorphic Rock

During times of deposition, immense amounts of material accumulate in low spots, and the lower portions gradually are transformed into rock by pressure of the mass above. Sand becomes sandstone; gravel is pressed and cemented into rock called con-

# HOW SEDIMENTATION LAYS MATERIAL IN LAYERS



## FORMATION OF A DELTA AT A RIVER MOUTH



## BUILDING ROCK ON THE OCEAN BOTTOM



en b the g en est dep he the be tom le composed of sore o soft c ay tiny see animale to m l

HOW FOSSILS TELL GEOLOGIC TIME Early Horse (MESOZOIC) ERA Ecfly Amphibian DEVONIAN PERIOD **Sè**6 -nolgras SILURIAN PERIOD ORDOVICIAN PERIOD Trilobite

At the left are illustrated rock layers of eight different ages. They are arranged as they normally occur—the newest at the top and the oldest at the bottom. In each layer is the fossil of some animal (shown alive at the right) which lived only at the particular time in earth history when that layer was formed. Hence the presence of any one of these fossils in a rock reveals its geologic age. The six lower formations shown here belong to the era of Ancient, or Paleoroic, life

glomerate. Mud is transformed into shale. Limy ooze becomes limestone or chalk.

Such rocks are called sedimentary, because most of them were formed from sediments. Some rocks are altered, however, after deposition, by contact with lava or other hot igneous rock, by material deposited from water, or by extra pressure. Limestone may become marble, for example, and shale may become slate. Such altered rocks are called metamorphic. (See also Minerals, Rock)

### The Keys of Geologic History

Throughout the ages these various processes have laid down deposits of rock and worn them away, and warped and twisted them, until today the array of rocks often seems a baffling jumble. But usually the rocks contain clues which tell well enough what happened

First is the nature of the rock itself. Rocks such as granite and basalt are marks of igneous activity. They always well up from below into cracks and openings in the crust. Sandstone, shale, and conglomerate are the remains of some near-by mountain range that has been worn down. Limestone indicates that the region where it lies was once under the sea.

Such clues do not tell, however, when a rock was formed. To determine this the geologist uses the "rule of layers" and clues provided by fossils.

## What the Rule of Layers Tells

The rule is simple. New deposits are laid upon older ones; hence in most arrays of rocks the oldest are at the bottom and the youngest at the top. Warping of the earth's crust may have overturned a series of layers, but the overturn leaves signs which tell what happened.

For any single region, the rule of layers works well. But it seldom helps in comparing one region with another, for the same layers cannot be traced to both. For example, rocks in North America cannot be matched in time with those in Europe or Africa. To meet this difficulty, geologists turn to fossils.

How Fossils Give a Yardstick of Time

Fossils are immensely helpful because of their very nature. A fossil is made when rocky material replaces the remains of some animal or plant, particle by particle. This makes an imperishable mold in stone of the original; and the mold endures through the ages, ready to tell its story whenever it is dug up (see Fossils).

The most helpful fossils are those of creatures which lived only a short time in geologic history. When fossils of such a short-lived species are found in different localities, the rocks which contain them probably were laid down at about the same time. Such fossils enable geologists to correlate rocks even from different continents, and thereby bring together the geologic history of the entire earth.

# Advancement in Knowledge of Geology

The simple principles given above provide the foundation for all geology. Of course, in advanced studies, help is needed from other sciences Many rocks cannot be identified exactly without chemical and physical

ical tests. Again theories about the origin of the earth are based largely upon knowledge obtained through astronomy and physics

But geology still has a vast field of its own which offers ca reers that combine study disconery and outdoor activity While rocks foss ls and similar matenal must often be stubed in a laboratory, much geolog cai work is done in the field and a geol ogists life can often be as adven turous as that of an explorer A geologist who prospects for oils or metals for example may go to the farthest and wildest places of the world

Even those who do not follow geology as a career will find the r lives enriched by some kn wledge of its principles. It will give new interest to every landscape they behold When they climb a moun tain they will know when and how it was made When they see an area

of flat rock they will be able to picture the ecene long ages ago when it was la d down The entire voild and every scene in it will have richer meaning when

DATING A FORMATION

the good shown here A compartson will show are not represented by depos to

geology has taught them how to understand what I es before them

Socational Opportunities Most of those who make geology a profession find employment in

one of these three fields 1 Work on the faculties of colleges universities and technical

schools 2 Work on state and national geological surveys

3 Work for petroleum and min mg compan es

Tie largest single group is em ployed by the United States Geological Survey Qualified men are appointed under civil service reg ulations They study the mineral resources of the nation and also prepare topograph cal maps of the national area Most states support sm lar activities Another large group is employed by the United States Bureau of Mines

Assde from the work provided by private industry uses geologists to aid in selecting s tes for dams tunnels bridges and other heavy structures and in providing water supplies

called the Sima zone (from sil ca and magnesium)

and the crust is called the Sial zone (from since and alum num) The average densities compared

to water are the core 120 the intermed ate

### Some Important Principles of Geology en I ferrum for gron) the intermed ate layer is

CINCE geology is the science of the earth a knowl edge of the earth itself is the basis of all else in this field. The first thing to grasp is the fact that the earth a crust is formed in layers

Geologists believe that two-thirds or more of the earth consists of a core which resembles highly compressed nickel and iron in density and elssticity Around this core is a thick intermediate layer of heavy igneous rock then con es the outer crust from 20 to 30 miles thick In this outer cru t he all the known sedimentary rocks such as limestone and sand stone but the deposits of these rocks form only thin patches

near the surface The

rest of the crust is com

posed of lighter kinds of

igneous rocks such as

granite The core is some

times called the Nife

zone (from the first parts

of the two words nickel

HOW THE-EARTH COOLED IN LAYERS

layer 43 the outer cru t Layers of Cool and Molten Rock

The outer crust as we know is cool and rigid The intermediate zone and the central core however. are in a hot plast c state called magma Magma is hot enough to be molten an I fluid if it were not confined but the weight which presses upon it from above keeps it as hard as steel It can creep however like cold molasses from beneath regions which acquire extra weight into locations which hear less weight. and it can flow through an open channel like the vent of a volcano

The fact that the outer crust "floats," so to speak, upon hot, plastic magma provides an explanation for many of the changes in the face of the earth through the ages. At times the changes occurred on a worldwide scale and constituted a geological revolution. But much more frequently they have taken place here and there in single regions.

# How the Shrinking Core Causes Revolutions

From time to time in the earth's history, the entire crust seems to have shrunk, like the skin on a

drying apple. In doing so it formed in various places around the world gigantic "wrinkles" which we call mountain ranges. This action can be explained by saying that the magma of the interior is losing heat slowly and contracting. But the crust, because it is solid and stiff, does not shrink gradually in keeping with the magma. It tends to hold its shape until the contraction of the underlying core has materially weakened support below. Then the erust collapses, and adjusts itself to fit the interior.

Most of these adjustments have been gradual and have not caused the world-wide disasters that otherwisewould have been

inevitable. The crust collapsed bit by bit, not all at once, over periods of thousands of years. A few feet, and even a few inches, a century were probably the usual rates of change.

Geologists believe that we are still living in the period of mountain building which has produced the Rockies, the Sierras, the Andes, the Alps, the Caucasus, the Himalayas, and the other high ranges of the earth. In some of them the uplift is by no means finished. Yet the occasional outbreak of a volcano or of an earthquake is all we notice of the change that is being wrought.

# Changes by Isostatic Adjustment

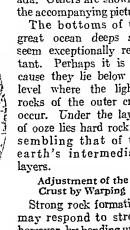
Lesser changes occur when weight is shifted from place to place in the crust by igneous intrusions, erosion, and deposition. The erust and the magma underneath respond with a slow adjustment. Newly accumulated excess weight squeezes out underlying magma toward every side; and the magma forces up surrounding lighter portions of the crust until the total weight of crust and magma is equal throughout the region. This state of equilibrium is called isoslasy (from two Greek words meaning "equal status"). Once it is attained, no further change occurs until ero-

sion, the formation of glaciers, or upheavals due to a world-wide revolution upsets the balance.

How the crust adjusts itself to the play of all these forces depends upon the strength of the rock in various regions. In certain areas called shields or coigns the rock was turned by heat and pressure into exceptionally strong formations and these have resisted change down the ages. When geologic revolutions have taken place, it was the weaker rocks around them that had to give way. The greatest of all

such formations, called the Laurentian shield, lies under eastern Canada. Others are shown in the accompanying picture.

The bottoms of the great ocean deeps also seem exceptionally resistant. Perhaps it is because they lie below the level where the lighter rocks of the outer crust occur. Under the layers of ooze lies hard rock resembling that of the earth's intermediate layers.



Strong rock formations may respond to stress, however, by bending up or down. This happened, for example, around the Great Lakes during the Ice Age. When the glaciers formed,

the tremendous weight of ice bent down the crust and squeezed out magma from underneath, forcing up adjoining parts of the erust. But as the ice melted away, the parts that had been forced up now became the heavier and squeezed the magma back, letting the Great Lakes region up again. This rise still continues at the rate of two feet a century in Canada, even though the glaciers disappeared thousands of years ago.

Warping may also take place on the edges of a continent, causing wide changes in the coast line, and at times admitting the sea far into the interior. This has happened several times to the area which is now the Mississippi Valley. When the crust sank the ocean came in, overflowing the sites where Chicago and St. Louis now stand. When the land rose again the water drained away.

Adjustment by Breaking and Folding

Where the crust contains much weak material, such as thick deposits of sedimentary rock, it may break instead of bending. The line where the break takes place is called a fault. If the crust is also forced together horizontally, as happens in times of shrinkage, one edge of the fault may be forced over the other, forming an overthrust. Again, various layers



The spots of orange mark shields (coigns) of hard rock which formed in the earliest days. Continents and seas have come and gone around them (as suggested by orange strips and bars on the blue sea); but the shields have endured without change.

### HOW MOUNTAIN RANGES ARE BORN AND DIE



Geologists he see that the es in a crust must shrink and winkis I be the st no is dry sg apple as the core a owly cools and ena cac a The "wrankles appear to us as great mountain faages



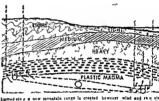




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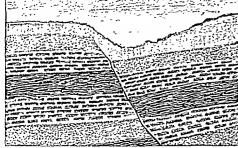
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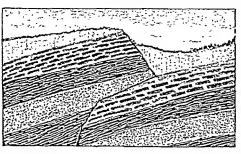


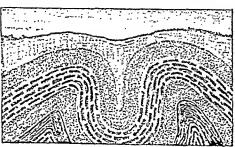
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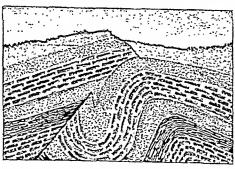


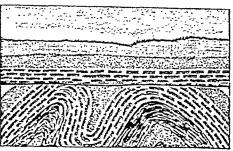
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may be squeezed into folds. without breaking. If a fold points upward, like an arch, it is called an anticline. If it turns downward, forming a trough, it is called a syncline. Some large synclines, scores or hundreds of miles across, are formed when sediments from great mountain ranges bend down the crust. These are called geosynclines.

### Geologic Events and the March of Life

The various revolutions in the geologic record are important not only in the history of the earth itself, but in the development of life. During times of stability between the revolutions, living conditions were easy on the level land. No high mountains existed to deflect rain-bearing winds and thereby create deserts (see Winds). Widespread oceans maintained warmth almost everywhere; even the polar regions had reasonably genial weather. There was little in the environment to force changes among plants or animals.

During the periods of revolution and mountain making. however, living conditions over much of the world grew harsh. Many regions became semiarid or complete deserts, because the new mountains deprived them of rain. The polar regions and many mountain ranges were glaciated. Many kinds of plants and animals could not endure the new environment and perished; only those survived which could adapt themselves to the changes. The great alterations in the forms of life on the earth can be correlated, therefore, with these periods as explained in more detail later in this article.

## Names of Eras Reflect Changes in Life

Because the revolutions were so important in the development of living things much of the story of geology is organized around them, just as we organize human history around outstanding events such as the fall of Rome, the Crusades, or the discovery of America.

The largest divisions of geologic time are called eras. Each era begins (roughly) with a world-wide revolution, and the names reflect the development which life attained because of it. Each name ends in zoic, from the Greek word zoe for "life." The first part of the name reflects the stage of development. For example, the name for the first era, Archeozoic, means "primitive life" from archaios, "ancient."

Each era is subdivided into periods, and each period into epochs. Although changes occurred in life in each of these divisions, they were not so profound as those from era to era; so geologists name many of the subdivisions for localities where the rocks of the subdivision were first recognized and studied, as told in the table. Others were named for outstanding characteristics. For example, European geologists call the time when the world's greatest coal deposits were laid down the Carboniferous period. (American geologists, however, consider this as two periods, called the Mississippian and Pennsylvanian.)

In the modern or Cenozoic era, the subdivision names again reflect the development of life. This era is not really a full era, but only the beginning of one. Geologists consider that it is still in its first period, called also the Cenozoic, and subdivide it into epochs only. These are named according

Here are various ways in which the earth's crust may break or wrinkle. From top to hottom they are: a simple break, or fault; a fault and overthrust; a fold; a fold which has heen altered by later fault and overthrust; a fold, with top eroded, and later deposits on top. The line where the strata do not lie evenly, one above another, is called an unconformity.

to a scheme proposed by the English geologist Lyell in 1833, and the names all end in "eene" throm the Greek kanney, "recent"). The first part of each name indicates what proportion of present-day animals and plants were in existence in the epoch.

An older system of names, based upon a d vision of geologic time into four parts, used the term Tert

geologic time into four ary for all but the last two epochs of the Cenoson period (the Pleistocene and the Holorene) There were called Quaternary time. The Pleistocene is often called the lee Age because it was the time of extensive glucution.

The rock strats which correspond to the lesser divisions in time are called systems, series, and formations A system concists of the rocke formed during one period -for example, the Cenozoro system series contains all the rocks of an epoch-for example, the Eocene A formation is a subdivision within an enoch

The significance and value of these names will become more apparent as we review the outstanding events in these divisions of geologic time

The Immense Span of Geologic Time The first outstand-

ing feature of geologe hatory is the fact that our earth seems to be exceedingly old. Astronomers have estimated that the solar system of which earth is part and somed shout 3 billion years ago. Estimates based on the decompation of uranium indicate that many vocks range from 12 to 2.2 billion years in age. A later methol anounced in 1952, gives figures as great as 3.5 billion years. Since the rocks used in these estimates were not the first once to form upon our plant scentists.

conclude that the earth must be very ancient Archeeole and Protecolac Beginning. Archeeole and Protecolac Beginnings was pent in 'beginnings' —the solidification of the earth and the beginnings' of the Gologists drives this and the beginnings of the Gologists drives this time with many uncertainties between the Archeeolac Cales called Archean and Protecologists are produced to the Archean and Prote

algae in some of the rocks formed in those remote times prove that life had begun

Proterozoic rocks contain clear evidence of life—foved algae, worm tracks and burrows limestone, and the black shales and graphitic slate which probably obtained their carbon from plant remains. Life must have been better developed, however, than these

CHAPTERS OF EARTH HISTORY

Archeozoic Era

Recamment than 2 billing years ago hasted more than 800 million years four drop one Keewanin Laurentian Timis garryo Alegoral manuel from districts in Causada.

Proterocole Era

Began about 1 .00 million years ago lasted 700 million years two divi ions. Hononian (th. oneigh) and Keweenawan

Pateozoic Era

Menozoic Fra

Bagan 190 m lion years ago lasted 130 million years. The periods with durations in millions of years follow Tatasave (33)—from these drivisms of the period Junasity (40)—from Jura Mits France Dwitzerland Cupracrotts (53)—from Latin orden menlang chalk

Genozoic Era

Esgan 60 million years ago said in first period which is also called Canonne Epochs with durations in millions of years follow Faurocent (5)—from Greek pulguos ancient, and Adanos

PALEDCENT (5)—from Greek parties and the recent recent COUNCINE (20)—from ces dawn Ousdonk (16)—from dispas scant; Middle (9)—from meton less

OLISOCENE (10)—from output scancy Mocerne (9)—from mean levs PLICENE (9)—from pleton more PLICENCE (8)—from pleton movel PLICENCE (13 000 to 40 000 years)—from helor entire early traces would in dicate, because highly developed forms appear at the beginning of the next ena, but probably the creatures concrined were soft bodied and did not form forsils. Also, igneous activity is believed to have destroyed much

of the evidence The earth was still young in these times and the crust was still being al attered by volcanto explosione and massive intrusions of magma between its layers of sedimentary rock Many of the huge intrusions. onlied batholiths (from bathos, "depth" and lither, stone"), were scores of miles across Other intrusions forced than layers of granite between sediments then, reneated foldings compressed and hard ened the mixture into schist (This name is applied to any rock which has a banded or layer

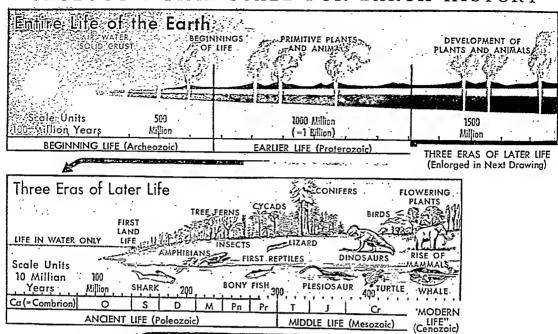
atructure Banded or schetors igneous rock, usually grants, is called

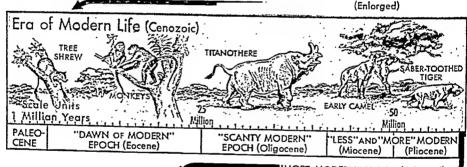
gments) These massive intrusions brought to the surface abundant numeral wealth, particularly non, copper gold, silver, neckel and radium. The great ron deports near Lake Superior consist of material white was leaded out of early intrusive deposits. Rocks of both these eras is at or hear the surface in the 'chield' regions of the earth, and are exposed in various deep gashes, such as the bottom of the Grand Choyon in Atrusi.

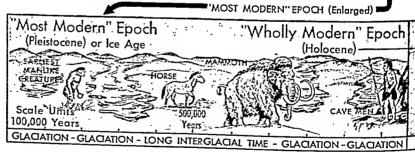
Flourishing Life of the Paleozoic Era

In contrast to the scanty record of hie in the early eras the record suddenly becomes rich at the very that of the next era, the Paleozoic This may have happened because the first period of the era

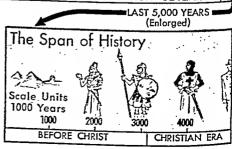
# GEOLOGY'S TIME SCALE FOR EARTH HISTORY







The top picture shows the geologist's idea (left to right) of how long the earth has existed. Man's time on earth is too short to show on this scale. It will not show even when the last three divisions are expanded in the second drawing on a scale ten times larger. To illnstrate it, two more tenfold enlargements are needed, first to show the Modern Era, and then the "Most Modern" and "Wholly Modern" epochs. This gives a time scale a thousand times larger than in the first pictures. Even now, the thin segment at the extreme right in the fourth picture must be enlarged a hundred times to show historic times. (In the second picture, letters indicate periods as follows: Ca, Camhrian, O, Ordovician; S, Silnrian; D, Devonian; M, Mississippian; Pn, Pennsylvanian; Pr, Permian; T, Triassic; J, Jnrassic; Cr, Cretaceous.)



the Cambrian, saw much of the earth submerged and the widespread seas contained shell bearing creatures which formed fosuls readily. Almost every class of marine life except vertebrates was present-miero scopic protozoana, sponges, jellyfish, worms, molluska brachiopods (lamp shells), and trilolutes (see Trilobite) But there is no clear evidence of any Cambrian life, plant or animal, on land

From the start of the period, North America had a shape which persisted throughout the Paleozoie era The continent was bordered, east and west, by two huge mountain ranges, Annalachia and Cascadia, The first extended from about the eastern edge of the present Annalachians well out into the Atlantie the other occupied the site of the Sierras and Cascades Inside these ranges lay a giant H of huge geosyn clines or depressions, which admitted the sea when ever the continent subsided. The crossbar of the H ran roughly from Montana and Wyomine to Ohio. Kentucky, and Tennessee Sediments from the moun tain ranges, alternating with deposits from the seas, gathered in the eastern and western geosynchnes, and provided the rocks which later became the Appalachians and the Rockies

The next two periods (Ordovician and Siluman) were similar. In the Ordovician, corals appeared and cartilaginous ancestors of fishes, as well as curious jellyfish that looked like scaweed, the graptolites The Silurian saw the advent of cancids, or sea tibes and eurypterids, or sea acorpions. Some developed air breathing organs and became land scorpions Land plants are suggested by doubtful fragments of stems

and leaves

During the Ordovician, North America underwent its maximum submergence of all time During the height of it, only the coastal ranges, part of the Canadian shield, and various islands were above water Four of these islands, formed where the crust warped up into gentle domes, have persisted as the Ozarks, the Wisconsin highlands, the Adirondacks, and a gentle rise scross Ohio and Kentucky called the Cincinnata arch The period also gave North America the oil and gas of Texas, Oklahoma, Ohio, and Pennsylvania, the limestone which became the marble of Vermont and Tennessee, and the slate deposits in Pennsylvania, Vermont, New York, and Virginia.

The Silurian was geologically quiet in North America, but in the North Atlantic a local disturbance, called the Caledonian, threw up a horseshoe of moun tains with one up in northern Greenland, another m northern Ireland and an arch between them running across Scotland, Scandinavia, and Spitsbergen Rem nants of these mountains still persist. The Silvrian contributed the iron ore in Alabama, and salt deposits

in New York

Vertebrates in the "Age of Fishes"

The next period, the Devonian, was notable for a rapid extension of plant life, scorpions, spaders, and primitive insects on the land, and emergence of smmals with backbones (vertebrates) in the sea The first of these were sharks, with cartilaginous skeletons, but true bony fish also appeared Many of these. like the mudfish of today, could breathe air for an extended time (see Mudfish), and geologists believe that some of these air-breathing fish became the first land vertebrates

In Devonian times many areas including old Apnalachia in North America, were uplifted, and material eroded from them produced vast stretches of sand and mud near sea level Over many of these flats. heavy rams alternated with dry spells. The mudfish could endure such conditions because they could breathe air if caught on land during a dry spell Eventually, in one strain, the fins are believed to have developed into crude legs, and these were the first amphibians, the parent stock of all other land vertebrates (see Salamander)

#### The Coal Age and the End of an Era

Conditions remained much as in Devonian times in the next period (Mississippian or Lower Carboniferpas) Then came the Pennsylvanian period for Univer-Carboniferous) when great coal deposits were laid down Swampy flats and a warm, humid climate produced huge forests of tree ferns. As the ferns died, the remains were preserved by the swamp water Gradually, this vegetation became coal (see Coel)

Dunne this period, insects attained their greatest size, some dragonfliet had wings hearly a vard across Amphibians flourished, and some began to lay eggs on Land These were the first reptiles

The earth also began to undergo one of its worldnide revolutions, with considerable mountain making Remnants of the mountains include the Appalachians and the belt of ranges across Europe from Weles to Czechoslovakia Mountain making increased in the next period, the Permian It brought an end to the generally genual Paleozoic era. Glaciers and deserts made living conditions hard, and only the most efficient types of plants and animals curvived to give rise to the life of the next era, the Mesozoic

"Transition Life" of the Mesosoic Era

The Mesozoic era contains three periods-Triassic. Jurassic, and Cretaceous In their course the Permian mountains and the continents generally were worn down During the Cretaceous period at the end of the era, shallow sens covered more of the continents than at any other tame These seas left vast deposits of chalk, for which the period is named

During these three periods, reptiles dominated the earth From the start of the era, giant dinosaurs stalked the land, other reptiles (plesiosaurs and schthyosaurs) lived in the sea. In Jurassic time, still others, the pterosaurs took to the air But even during this reign of the reptiles the life of modern times got a start A sort of "feathered flying reptile " called Archeopteryz appeared in Jurassic times, foreshadowing modern birds. In the same period the first mammals appeared

In plant life the Paleozoic tree ferns had given way to eyeads, gunkgos, and primitive conifers of Trassac time Modern flowering plants including grasses and trees, may have started in the Jurassic period; they became abundant in the Cretaceous. Then came the start of another world-wide revolution and with it the dawn of modern times.

The Beginning of the Modern Era

In North America, the change to modern times began late in the Cretaceous with the Laramide revolution—a tremendous squeeze between the hard rock of the Pacific basin and the great "anchor" of the Laurentian shield which folded up less resistant intervening areas. It created the ancestors of the Rocky Mountains, drained the swamps, and cut off the lush food supply of the great plant-eating dinosaurs, thereby helping to extinguish these monsters and many other reptiles. Thus the world was ready for the new mammals to develop and flourish.

Similar revolutions elsewhere, at various times during the era, raised the Andes of South America, the Alps, the Pyrenees, the Carpathians, and the Caucasus in Europe. Some of the first ranges to be thrown up, such as the Rockies, were later worn down and still later raised again. Rapid erosion cut away the softer deposits, leaving the harder rocks standing out in bold relief. The whole depth of the Grand Canyon was carved out in this time. Older mountains, such as the Appalachians, were again elevated and new valleys and peaks were cut by their rejuvenated streams.

From one to two million years ago, an unexplained change of climate brought a widespread Ice Age (eee Ice Age). The last wave of ice began melting from perhaps 40,000 to 13,000 years ago, depending upon the locality. As it receded, the world and its natural life took on the appearance we know today.

Measuring Geologic Time

Geologists determine the age of rocks and their fossils in several ways. One long-established method is based upon the radioactive decay of uranium in unweathered deposits. Half of any amount of uranium turns into lead and helium in about 4.5 billion years. Comparison of the actual amounts of these substances in a sample therefore gives its age. A more recent method uses tiny amounts of rubidium, strontium, and other elements, as well as uranium. This method can be applied to common rocks such as granite, which was formed during many periods.

In the 1940's, W. F. Libby and James Arnold began to use radioactive carbon 14 (an isotope of ordinary carbon 12) to date deposits of late glacial and postglacial times. Plants and animals absorb this isotope, but when they die it begins to decay at a regular rate. The age of substances such as bone and wood can be determined from the ratio between carbon 12 and the carbon 14 remaining in them.

# GEOMETRY-Science of SPACE RELATIONS

CEOMETRY. When we lay out a baseball diamond, we use methods from the science of geometry. Builders and engineers apply geometric principles in designing huge buildings, bridges, and roads. Methods based upon geometry help aviators to find their way across the oceans and astronomers to plot the stars. The very name "geometry" suggests connection with the measurement and study of space. It comes from the Greek terms geo-, meaning "earth," and metria, meaning "measuring."

Our common names for many familiar objects come from geometry. Among them are angle, circle, cube, and sphere. Others are given in a diagram on the facing page. Geometry, however, has much more than this to offer. This science is a great aid to other sciences. Help from geometry enabled Kepler to solve the age-old riddle of planetary motion and to prove that the earth goes around the sun. Today advanced knowledge gained from geometry helps scientists in probing outer space and in suggesting what might lie beyond our galaxy of stars.

How Geometry Attacks Its Problems

Geometry also provides a powerful means for organizing and analyzing data in any scientific investigation and for testing the truth of the conclusions reached. This consists of adapting the method which geometry has developed for solving its own problems by reasoning step by step from the beginning to the end of a problem. Geometry does not "guess" or use reasoning that "may be right" or "partly right." Engineers could not use that kind of basic help in designing a jet plane or a huge power dam. Geometry

develops answers which are precise. If the data for the reasoning are correct, then the conclusion reached must be right. This method of reasoning is called

geometric proof.

Geometers have found that among all the properties of objects in space a certain small number are so obvious as to need no proof. The geometric method of reasoning begins with these self-evident facts. An example is the statement, "Things which are equal to the same thing are equal to each other." A test for selecting such facts can be stated thus: "This statement seems so basically true, it is hard to imagine the situation being otherwise." One such test is the famous one still used today which was made by the Alexandrian geometer Euclid in the 3d century B.C. An example will show how it is used.

How "Line" and "Point" Establish "Angle"
Everyone has a good idea of what is meant by a "point" and by a "straight line." They are examples of what can be accepted without proof. Geometry

therefore accepts these as undefined terms. Everyone

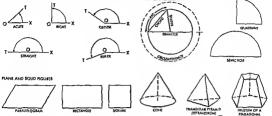
also has some idea of what is meant by an "angle." In the case of an angle, however, it is desirable to have a precise definition. It can be given in terms of points and lines in two steps:

X 2 5

1. Intersection: If two straight lines (AB) and (XY) have only one point (O) in common, they are said to intersect.

2. Angles: Where the straight lines intersect they form angles (marked 1, 2, 3, and 4 in the dis-

## GEOMETRIC FIGURES THAT RUN THROUGH OUR DAILY LIVES



SICTANGULAR CUEP ORICUE
PARALLELEPHD PARALLELEPHD

These disgrems show shepes and objects that ere found the each out our buildings, machines, and other structures. Such geogram.) These angles can be written in terms of the lines and point as (1) angle AOX, (2) angle NOB, (3) angle BOY, and (4) angle YOA. Thus the angles

are defined precisely
It is necessary also to provide a means for measuring
any angle. This can be done by supposing an angle to
be generated ("made") by relation: If a point (0) is
selected and two lines (OX) and (OY) are drawn from
it, the resulting figure is called an angle. The point (0)
is called the vertex of the angle and the lines OX and

OT are called the sides If now the line OT is thought of as the hand of a clock being turned counter-clockwise, then the angle may be thought of as the amount that line (OT) must turn to go from position OX, positions OT, OT, OT, and

so on The amount of turn can be measured in de grees or any other suitable unit

Rices or any numer consiste con-To "name" an angle, the vertex letter is placed between the two letters found at the extremities of the sides (and an angle sign Z may be used), thus ZNOT A right angle is formed when upe side of the angle is rotated through one fourth of a complete revolution, or 90° (ZNOTs)

Using Angles to Test Other Propositions
These definitions of angles can be used to test
various important relations between sets of lines
various important relations between the angles
and the sets of lines must be stated in terms that are

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convenient for use Definitions for the important relations between sets of lines are as follows Vertical angles If two lines

intersect, then the angles AOY and BOX are called vertical angles. They are angles that a have a common vertex and respective sides that he in two straight lines (AB) and C

Transcered If two lines are ent by a third line the third feet by a third line the third see said to be a transversal of the first two lines in the diagram, Gff is a transversal of lines CD

and EF
Alternate-interior angles: If two lines are cut by a
transversal, the angles CIG and HJF are called
alternate-interior angles: The angles EJH and DIG

are also alternate-interior angles

Corresponding angles If two lines are cut by a
transversal at any angle, then the angles EJH and
CHH (and also the angles FJH and DIH) are called

corresponding angles

Parallel fines It is now possible to state an extremely unportant definition. It is this If two lines
are cut by a transversal so that the alternationardes are equal the lines are parallel.

This definition as a very important one in the study of geometry From Ducid s time until a comparatively recent date it was thought that it was monoscapt to have parallel lines in geometry. These

lines were "imagined" to be capable of extension to infinity without ever meeting. However, in the 19th century the mathematician Riemann developed a "closed space" geometry, like that on a sphere, in which there are no parallel lines. This can easily be visualized if the great circles on the sphere are called lines. Lobachevsky, a famous Russian mathematician, developed a geometry in which there are many lines parallel to a given line.

The geometries of Riemann and Lobachevsky are called non-Euclidean geometries. Einstein used these ideas in developing his theory of relativity (see Relativity).

Working Propositions Called "Postulates"

The preceding examples show how geometry uses accepted propositions on which to build others. We started with two ideas-points and lines-which were accepted as undefined terms without proof. Geometry must also have certain "working propositions" called postulates, because without them we could not reason further. We must accept certain ones among them without proof, because it is impossible to prove all statements in geometry. For the purpose of this article, the following propositions are accepted as postulates:

- 1. Two straight lines can intersect in only one
- point.
- 2. Through a given point not on a given line, one line can be drawn through the point parallel to the given line. (This is a form of the famous parallel postulate of Euclid. Riemann did not use this postulate.)
- 3. All straight angles (those whose sides and
- vertex lie on a straight line) are equal.
- 4. If two equal angles have a common vertex and one common side, and the remaining side of each angle lies on the same side of the common side, then the remaining sides must coincide.
  - Equals subtracted from equals leave equals.
  - 6. The whole is equal to the sum of its parts.
- 7. Equals may be substituted for equals in any statement of equality.

## The Nature of a Geometric Theorem

We all know that in many cases in everyday life, if certain facts are true or come true, certain conclusions must follow. In geometry, likewise, certain statements follow logically from the accepted postulates, defined terms, and undefined terms. These derived statements are called theorems.

Theorems are generally stated in an "if-then" form, consisting of two parts: (1) the "if" part, called the hypothesis; and (2) the "then" part, called the conclusion. The "if" part, or hypothesis, is sometimes called the "given" part. The steps leading from the hypothesis which finally justify the conclusion are called the argument, or proof. Anything stated in the hypothesis may be used in the argument without citing any proof, since such statements are taken as true for the sake of the argument. The methods of working out proofs can be illustrated by proving a few theorems.

Theorem 1. If two lines intersect, C the vertical angles are equal.

Hypothesis: Any two lines (AB) and (CD) intersect at (P).

Conclusion: ∠APC = ∠DPB. (This is the part of the theorem which must be proved, to follow logically from the hypothesis and the postulates.)

Argument:

1.  $\angle APB = \angle CPD$ Reason: all straight angles are equal.

- 2.  $\angle APC + \angle CPB = \angle APB$ Reason: postulate 6.
- 3.  $\angle CPB + \angle BPD = \angle CPD$  Reason: postulate 6.
- ∠APC+∠CPB

 $= \angle CPB + \angle BPD$ Reason: postulate 7.

5.  $\angle APC = \angle BPD$ Reason: postulate 5. (Subtract ∠CPB from each side of the equation in step 4.)

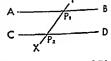
Thus it has been proven that vertical angles are equal. In the proof, each statement is supported by some previously accepted statement, and the final one follows as a result of the proper combination of the previous statements. This is an example of a deductive proof in geometry.

## How Theorems Lead to Other Theorems

An important feature of geometry is the fact that a theorem, once proved, can be used to prove other theorems. No part of it need ever be proved again. This fact will appear in the next theorem.

Theorem 2. If two lines are parallel and are cut by a transversal, then the corresponding angles made by the transversal are equal. (Note: in the earlier definition of corresponding angles, it did not matter whether the lines were parallel. It mattered only that the angles stood in corresponding positions relative to the lines. Now parallelism introduced, and a consequence of this addition

is to be proved.)



Hypothesis: Any two parallel lines (AB) and (CD) and any transversal (XY) are given.

Conclusion:  $\angle YP_1B = \angle YP_2D$ .

Argument:

1.  $\angle DP_2Y = \angle AP_1X$ . Reason: alternate-interior angles are equal by the definition given of parallel lines.

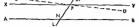
 $\angle BP_1Y = \angle AP_1X$ . Reason: vertical angles are equal by theorem 1. (This is an example of using a previously established theorem in the course of proving another theorem.)

3. ∠YP<sub>1</sub>B = ∠YP<sub>2</sub>D. Reason: postulate 7.

## The Use of Indirect Proof

Another aspect of theorems is proof by the indirect method. Theorem 3 is an example. This example will also show that a postulate cannot be taken to mean more than it says. For example, postulate 2 justifies drawing a line parallel to a given line through a point not on the line. But the postulate does not say that only one line can be drawn through the point parallel to the other line. Before this statement can be accepted as true, geometry demands that it be proved This proof can be developed as follows

Theorem 3 If a line and a point not on the line are given, then one, and only one, line can be drawn through the point parallel to the given line



Hypothesis Any line (AB) and any point (P) not on AB are given

Conclusion One, and only one has can be drawn through P parallel to AB Argument

1 One line (XY) can be drawn through P parallel to AB Reason postulate 2

2 Following this there are only two possible situations, as follows a Only one line can be drawn through P parallel

to AB or
b It is possible to draw more than one line through

D this possible to draw more than one line through
P which will be parallel to AB
3 Assume that outcome (b) is possible Let such a
line be CD Draw any transferral (LVI) through

point P
4 LM will intersect AB in one point (N) Reason
postulate I

5 ∠BNP=∠NPC Reason CD is assumed pur allel to AB Therefore by definition of parallel lines, these angles must be equal

6 ZBNP= ZNPX Reason line XY is parallel to CD. By definition there angles must be equal

to CD By definition these angles must be equal 7 Hence \( \times \) NPC \( \times \) NPX \( \times \) Reduce postulate 7 8 Therefore line PC coincides with line PX, that is lines XY and CD must be the same line

Reason postulate 4
9 Hence it is impossible to draw more then one

line through P parallel to AB

This theorem was proved by the indirect method to that the only two possibilities were listed it is possible to draw only one has that satisfies the given conditions, or it is possible to draw more than one time. The second outcome was proved to be impossible. Therefore the first possibility (only one line) has to be the correct one.

has to be the correct one (This method of proof is often called by the Jaim phrave reduction of nodes are discussed in the control of the thought of the tho

An Important Theorem about Triangles

The following example is built upon postulates
and accepted facts about a straight angle

It yields

a conclusion which is among the most fundamental properties of triangles

Theorem 4 In a triangle (ABC) the sum of its interior angles (those inside the triangle) is equal

to a straight angle (180)

to a straight angle (180)

Hypothesis Any triangle X

(ABC) is given

Comclusion The sum of

ZABC+ZBCA+ZGAB = a straight angle
Argument
1 Through C draw a line (XY) parallel to AB

(This can be done under postulate 2)

2 ∠XCY is a straight angle Reason definition

of a straight angle

3 \( \angle XCA + \angle ACB + \angle BCY = XCY = a \) straight

angle Reason postulate 6

+ ∠BAC = ∠ACX and ∠BCY - ∠CBA Reason definition of parallel lines by equal alternate-interior

ages

5 ∠BAC+∠ACB+∠ABC=a stmight angle

Receon postulate 7
6 Hence the sum of the interior angles of a triangle

equals a straight engle
All these examples together show the careful, "step-

by-step way in which geometry works from known or accepted facts to prove that other propositions must be true beyond the possibility of question or doubt Nature of Converse Theorems The "fit than must of come theorems may be inter-

The "if then" parts of some theorems may be interchanged Other theorems do not allow this For example the statement that if two lines are parallel, then the corresponding angles are equal as true theorem Interchanging the hypothesis and the conclusion gives this estatement if the corresponding angles are equal then the lines are parallel. This is also a true theorem.

If a new externent is made by interchanging the hypothesis and conclision, it is called the converse of the original statement. A theorem (statement) and its converse on not always both true. For example, it is a parallelogram (opposite usides parallel), the converse is not true. A parallelogram is not necessarily a rectangle.

#### Contrapositive Theorems

If the hypothers and conclusion are both demed by stating in the negative, and then interhaped, the result is true of the original theorem was true. The reall from these steps as nontripoposine theorem. To illustrate it is a true theorem that if two angles are night angles then they are equal. New theorem if two angles are not equal, then they are not both right angles are not equal, then they are not both right angles. This is also true

It can be shown that a theorem and its contrapostive are always both true or both false. Thus, suppose the theorem if A=B then C=D is true. The contrapositive (if C=D then A=B) can also be proved. I Either A=B or A=B reason things are either

equal or not equal (#
means "not equal to')

2. If A=B then C=D Reason: the original theorem, assumed true.

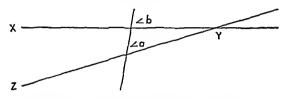
3. But C≠D Reason: hypothesis.

4. Hence C=D and C≠D Reason: combining statements 2 and 3.

 This is impossible, so Reason: as given in state-A≠B ment 1.

This is a reductio ad absurdum proof.

Proving Theorems with the Contrapositive Theorem. If two intersecting lines are cut by a transversal, the corresponding angles are unequal.



Hypothesis: Lines ZY and XY intersect at Y. To be proved:  $\angle a \neq \angle b$  ( $\angle a$  is not equal to  $\angle b$ .) Argument:

1.  $\angle a$  is less than  $\angle b$  Reason: the exterior angle ( $\angle b$ ) of a triangle is greater than either opposite interior angle.

2.  $\angle a \neq \angle b$  Reason: by statement 1.

This proves the theorem. Now take the contrapositive of this theorem, with this result: If the corresponding angles are equal then the two lines which are cut by a transversal will not intersect. This last theorem is the equivalent of one of the theorems previously proven about parallel lines.

Inverse Theorems and Eulerian Diagrams

If the hypothesis and conclusion of the theorem are denied but not interchanged, then a new theorem results which is called the *inverse* of the original theorem. A theorem and its inverse are not always both true. Both the inverse and the converse, however, are always both true or both false.

A famous Swiss mathematician, Leonhard Euler, showed how to remember the relations between a theorem, its contrapositive, its inverse, and its converse. For an illustration of Euler's method (called Eulerian diagrams) consider this statement: If Mr Smith lives in Iowa, then he lives in the United States. This is, of course, a true statement.

Now draw a circle for Iowa and around it, a larger circle for the United States. Now let P

UNITED STATES

**AWOI** 

represent the place where Mr. Smith lives; and check the statement about his residence. It is obviously true, because the point P is in both circles.

The converse of the statement is: If Mr. Smith lives in the United States, then he lives in Iowa. This statement cannot be accepted as true without form

accepted as true without further facts or proof, because Mr. Smith might be living at point N.

The contraposition of the days of the second proof.

The contrapositive of the statement is: If Mr. Smith does not live in the United States, he must

be living at a point such as L outside the United States. Therefore it cannot be in Iowa.

The inverse of the statement is: If Mr. Smith does not live in Iowa, then he does not live in the United States. This statement could be false. Mr. Smith might be living at a point such as N.

With the aid of the Eulerian diagram and the illustrations given above, it is now possible to pair a given theorem and its three derivative theorems in the following manner:

The Theorem and Its Contrapositive

Are always both true or both false.

The Converse and the Inverse

Are always both true or both false.

The Theorem and

Are not always both

Its Inverse or Converse

true or false.

## The Geometric Meaning of Loci

The logical structure of geometry demands the use of the converse, contrapositive, and inverse of a theorem. This is clearly brought out in the study of loci in geometry.

A locus of points (plural, loci) is a geometric figure formed by all those points, and only those points, which satisfy a certain condition or set of conditions. An illustration may serve to make this idea clear.

(1) If a point is on the line, then it is equally distant from XY and AB; (2) If it is equally distant from both XY and AB then it is on the line LM.

Now notice that these two statements are converses of one another. Since they are converses and both true, it is possible to say; "All those points, and only those points, equally distant from XY and AB (in the plane) are on the line LM." The three words "only those points" in the preceding sentence are important. They assure us that no points not on the line LM are equally distant from XY and AB.

The proofs of theorems involving loci always consist of two parts. This is necessary because of the definition of a locus. Note that the definition consists of two parts. These are: (1) "all those points, and (2) only those points." The following example will show how and why these two parts (a statement and its converse or a statement and its inverse) are necessary to prove a locus theorem.

Theorem: The locus of points equidistant from the sides of the angle is the bisector of the angle.

Part I of the proof: We prove that if the point is on the angle



bisector, the point is also equally distant from the aides of the angle

Given the ZAOB and the angle bisector (OC), together with (P), a point freely chosen on the bisector

Argument  $\Omega P = \Omega P$ Reason they are identical ∠NOP= Reason OC is a bisector

ZPOM /NPO= Reason statement 2 and the fact ∠MP0 that the complements of equal angles are emul

AMPO congruent if two angles and the included side of one triangle are equal to the corresponding parts in the other

Reason two triangles (A) are

PN-PM Reason corresponding parts of congruent triangles We now know that any point on the bisector is also

equally distant from the sides We do not yet know, however, that points which are not equally distant from the sides of the angle are not on the hisector Part II of the proof We now prove that if the point is equally distant from the sides of the apple, it must

he on the bisector of the angle Guen PN = PM and OC, the bisector of ZBOA \*

ANPO=

To be proved P is on OC Argument

PN is 1 to Region a perpendicular (1) BO and PM is may be dropped from a point to a hae I to AO

Define PO Reason two points deter mine a line Reason angles at M and N OPN and OPM

are right triangles are right angles PN = PMReason given

P0=P0 Reason identity ΔPNO - ΔPMO Reason two right triangles

with the hypotenuse and one legequal are congruent ZNOP = ZMOP Reason corresponding parts

PO bisects angle Reason definition 9 Phes on the bi- Reason an angle can have

but one bisector sector OC This completes the second part of the proof

How Geometry Started in Early Times Geometry began in the river valleys of Egypt and Mesopotamia to provide means for replacing land marks after floods for designing irrigation systems, and for controlling the building of huge temples Each people also, was interested in tracing the movements of the sun, moon planets, and stars for timekeeping maintaining a calendar, and for religious reasons A collection of practical rules and methods for solving geometric problems arose to meet these needs

To fix a location for a temple, for example the Egyptians used a triangle of rope, cut to the correct lengths to make a right angle, and they stretched the triangle tight to establish the angle on the ground The Sumerans counted the divisions of a circle by settes, a rule we still follow with degrees, minutes. and seconds and the divisions of time

Neither people, however, tried to discover the general principles which formed the basis of the practical rules This was done by the ancient Greeks

The Greeks Discover Geometric Principles

The first man known to us who developed geometric principles was Thales of Miletus, one of the "seven wise men" honored in Greek tradition. In the late 7th century or early 6th century B c , he established many rules about euroles and developed them into principles concerning the properties of a circle as a geometric object regardless of how the circle might figure in practical problems

Another early contributor was the mystic and philosother Pythagoras, of the 6th century B C He is noted for the Pythagorean theorem, that the squares of the sides of a right angle are equal to the square of the hypotenuse

Amone the many individual contributions made in the next three centuries, one outstanding achievement was the development of come sections by Apollonna of Perga The astronomer Hipparchus devised a system of chords which he used for computing angles in the heavens. This was a forerunner of trigonometry The philosophers Plato and Aristotle gathered the principles that were known by their time and added many ideas to them

About 300 & c . Duchd of Alexandria drew together all the Greek knowledge of geometry in his 'Elements' In this work he gathered all the propositions with proof at every point from beginning to end, and organized them into a magnificently logical science The Elements' still provide the have for the modern study of reometry

After Euclid, the greatest ancient geometer was Archimedes He devised many methods for solving problems and came close to figuring the ratio (#) of a circle's diameter to its circumference. His method

foreshadowed procedures of modern calculus Descurtes Applies Algebra to Geometry Geometry remained largely as Euchd left it until early modern times In 1637, René Descartes pro-

duced the method, called analytic geometry, of expressme geometrie relations in algebraic terms Modern graphs are examples of this method Descartes also devised a method of expressing shapes, locations and movements in space by measurements along three lines (usually called x, y, and z) that correspond to the length, breadth, and height of a solid object. The lines are called Cartenan co-ordinates Since algebraic commutation as usually easier and more productive of information than the ancient method of using figures, modern mathematicians generally study geometric problems by Cartesian methods

Modern Non Euclidean Geometries

All geometric problems that arise in everyday expenence can be solved by Euclidean geometry one doubtful point about Euclid's system is whether the world and the space surrounding it actually 'fit" this geometry. The assumption that Euclidean

geometry does "fit" the space relations of the world is commonly called the Euclidean view.

During the 19th century, several mathematicians devised non-Euclidean systems based upon other assumptions. They did so as a matter of intellectual interest. Some of this work proved of value when astronomers became interested in the vast distances outside our galaxy of stars and when physicists began dealing with the tremendous velocities studied in atomic physics. Einstein used Riemann's "closed space" geometry in developing relativity, and other non-Euclidean systems may prove of practical value. GEORGE, SAINT. No one knows for certain whether Saint George, the patron saint of England, ever existed. Certainly there was a George of Cappadocia who suffered martyrdom about A.n. 303 at Lydda, in Palestine, during a persecution of the Christians: but nothing is known of his life. Not until the 6th century A.D. was his name connected with a dragon.

During the Middle Ages many legends grew up about Saint George. The best-known story pictures him as a knight who rescued a king's daughter, Sabra (representing the Church), from a dragon (representing the Devil). After slaying the dragon, George gave all he had to the poor and went forth to preach Christianity. He died a martyr.

Saint George was adopted as the patron saint of England in the days of Edward III and the Hundred Years' War. His feast is celebrated on April 23. England's first flag was the red flag of Saint George ou a white field. (See also Dragon; Flags.)

## SAINT GEORGE AND THE DRAGON



Many artists have depicted the legendary encounter between the dragon and Saint George, patron saint of England. This engraving is by the German artist Lucas Cranach (1472-153).

# GEORGE, Kings of GREAT BRITAIN

SIX kings of Great Britain have borne the name George. The first four were also German princes of the House of Hanover (see Hanover). George V and George VI belonged to the House of Saxe-Coburg-Gotha. This house was renamed Windsor during the first World War, in the reign of George V.

GEORGE I (born 1660, ruled 1714–1727). George Louis succeeded his father as elector of Hanover, a north German state, in 1698. His mother, Sophia, was a granddaughter of James I of the English Stuart line. The English Act of Settlement (1701) had barred Catholics from the throne and exiled the Catholic heirs of the Stuarts. When Queen Anne died, in 1714, George succeeded to the British throne as the nearest Protestant heir. In 1715 a rebellion in Scotland in favor of the Stuart "pretender" was easily put down. (See Pretender.)

George was 55 years old when he became king of Great Britain. He was more interested in Hanover—which he continued to rule—than in Britain and divided his time between the two countries. Since he spoke only German, he left almost all the business of the British government to his ministers. Finally he even stopped attending Cabinet meetings. Sir Robert Walpole, his chief minister, headed the Cabinet in the king's place and thus became in effect Britain's first "prime" minister.

Long before George came to England, he had divorced his wife, Sophia Dorothea, for misconduct. She was imprisoned in Hanover until her death in 1726. There were two children of the marriage. The daughter married the elector of Prussia. The son succeeded his father in Hanover and in Great Britain.

GEORGE II (born 1683, ruled 1727-1760). Like his father, George I, George II was more interested in Hanover than in Britain. He was a vain, pompous little man, fond of show, but extremely economical. One of his favorite diversions, it was said, was counting his money like the king in the nursery rhyme.

George II followed his father's example in staying away from Cabinet meetings. He left government affairs to Sir Robert Walpole and later to other political leaders after Walpole retired. Under the clder William Pitt, just as the reign was ending, Britain gained brilliant victories in the French and Indian War (see Chatham, William Pitt, Earl of). The Jacobite rising of 1745 was a much more serious affair than that of 1715, but it too proved unsuccessful (see Pretender). George's queen, Caroline of Anspach, was a woman of remarkable ability who proved a tower of strength to her weak husband and to his ministers.

GEORGE III (born 1738, ruled 1760-1820). George III was a grandson of George II. (His father, Frederick, Prince of Wales, died in 1751.) He was the first of



George I





With George I, the Ger man House of Hanover eams to the British throng in 1714 These first three kings of the Hanovanan line were more German then Brelish

the Henovarian rulers to be born and educated in Britain His mother ignorant and too devoted con tinually urged him George be king! Following this advice he attempted to restore the kingship of Great Britain to a position of power not unlike that which was held by his cousin. Trederick the Great of Prus sia Unlike his cousin George had only average chil ity but he had more than average obstinacy. He refused to give up his course until he had lost for Great Britain the 13 American colonies and inflicted more profound and enduring injuries upon his country than any other modern English king William Lecky the Brit sh historian just quote i says elso that George III spent his 60-year reign-longer than that of any other British ruler except Queen Victoria-in obsti nately resisting measures which are now almost um versally admitted to have been good and in support ing measures which are as universally admitted to bave been bad By gifts of offices t ties contracts and even money bribes he sought to build up in Parliament a party known as the king a friends When the

ment George had long been subject to penodic at tacks of meanity During the last ten years of ha life he was both insane and blind GEORGE IV (born 1762 ruled 1820-30) For tea years George IV reigned as king For time years be-

Amer can colonists triumphed at Yorktown in 1781

the liberal minded Whigs took control of the govern

for his accession he was prince regeot (acting king) because of the mainity of his father George III. He was a dissolute and incompetent ruler though he posed as the first gestleman of Europe. He treatment of he young queen Caroline of Brunswith was abominable and when he attempted to diverse was abominable and when he attempted to diverse must both in Great Brita a and in Himoter was in the hands of his ministers. Since his only child a daughter had died his brother William IV succeeded hus (see Will am IV).

GEORGE V (born 1855 'ruled 1910-1939) Britaus king during the first World War was Georga V He cut hunself off from all German connections and t ties and announced that the roy all ne would thenceforth be known unt as the House of Saxe Coburg Gotha but as the House of Windsor from the royal castle of that name in Eveline.

George V was the grandeon of Queen Austerna and the son of Edward VII. From the age of 12 by was tramed for the sea. He had usen to commander of the Britch many when the death of his older better made him at the age of 28 heir to the three. Like his father he gamed personal knowledge of the outlying posts of the British dominions and colonies by a tour before he became king.

In 1873 George married Mary the only daughter of the duke of Teck Five of their children reached

### BRITAIN S ROYAL COACH BUILT FOR GEORGE III



This gilded couch drawn by sight horses is still used futate occas out such as coronations and the dresung of Pasamant, The richly ornamented carriage is supported in

berge criticus two in front and two in back. The coach we built in 1701 This poture was taken in 1936 on the occi-

# GEORGE V AND GEORGE VI AND THEIR QUEENS





George V, Britain's king during the first World War, died in 1936. His consort, Queen Mary, survived him and lived to see two of her sons and her granddaughter occupy the throne.

maturity: Edward, prince of Wales, who became king as Edward VIII; Albert, duke of York, who succeeded Edward as George VI; the duke of Gloucester; the duke of Kent; and Mary, the princess royal, countess of Harewood.

As king, George maintained the wise policies of constitutional rule followed by his father and grand-mother. During his reign the Crown became, as it had never been before, the connecting link between the mother country and the self-governing members of the British Commonwealth. In May 1935, the silver jubilee (25th year) of his reign was celebrated. He died in 1936.

Equally with George, Queen Mary shared in the love and loyalty of the British people. After the death of the king, she continued to appear at public ceremonies. She died at the age of 85 in 1953.

GEORGE VI (born 1895, ruled 1936-1952). Albert, duke of York, was the second son of King George V and Queen Mary. Upon the abdication of his elder brother, Edward VIII, in December 1936, he became king of Great Britain and took the name of George VI.

Prince Albert was sensitive and shy and had a decided stammer. He excelled, however, at athletics and was an enthusiast for sports—hunting, polo, and tennis. His education was carefully planned from childhood, and it was decided that, like his father, he should enter the navy. He went to school at Osborne and Dartmouth and took the usual examinations with the other boys. After his 17th birthday he went to sea. He was a sublicutenant on H.M.S. Collinguood when the ship was heavily engaged in the battle of Jutland (1916). In 1918 he was transferred to the Naval Air Service and took his pilot's certificate in 1919. He then went to Cambridge University.

Albert was created duke of York in 1920. In 1922 he married Lady Elizabeth Bowes-Lyon (born 1900), youngest daughter of the earl and countess of Strathmore. She was of Scottish royal blood, an ancestor



George VI came to the throne in 1936 when his elder brother, Edward VIII, abdicated. This picture was taken in 1948 on the 25th wedding anniversary of George VI and Queen Elizabeth.

having married the daughter of the Scottish king Robert II in 1376. The Strathmore estate, Glamis Castle, was the scene of Shakespeare's tragedy Macbeth'. The "smiling duchess" soon won the affection of the people, and this affection extended to her children, Princess Elizabeth Alexandra Mary and Princess Margaret Rose.

In 1939, just before the outbreak of the second World War, George VI and his queen visited Canads and the United States. Throughout the war years they remained with their people. Much time was spent in Buckingham Palace, though this royal residence, like the rest of London, went through its ordeal of air bombing by the German air force. The presence of the king and queen in London and their messages broadcast during years of anxiety and strain did much to hearten and inspire the people of Britain and the Commonwealth nations.

The king's health gradually gave way, and he died at Sandringham, in Norfolk, in February 1952. He was succeeded by his elder daughter, who ascended the throne as Elizabeth II (see Elizabeth II).

GEORGE JUNIOR REPUBLIC. Near Freeville, N. Y., is a model "junior republic" where teen-age boys and girls are trained to become useful citizens. The community covers 550 acres. The village has a bank, general store, government building, and chapel. The young people make laws for their special needs, elect officials, hold court, and collect taxes. Besides going to school, they work the farms, repair buildings, run offices, cook, and keep house. They are paid in token money. The motto of the republic is: "Nothing without labor."

William Reuben George founded the community in 1895 for needy children. He believed that children in their teens can govern and support themselves and that lack of responsibility breeds indifference to law and order. Similar communities were founded in other states.



## GEORGIA-The "EMPIRE STATE of the SOUTH"

EORGIA STATE OF As the state of New York is called the Empire State so is Georgia nick named the Empire State of the South The name reflects its size and rapid and a aried industrial growth. It is the largest state east of the Mississippi River and has an area nearly as great as all New England

About half of Georgia s area is covered with for ests and it is the second state east of the Pacific coast in lumber product on Only Oregon Washing ton California and Alabama surpass it On its farm land Georgia grows a great array of different crops Various locations have the right combination of soil and climate for almost every important crop of the temperate zone. It also has many fru to vegetables and other plants typical of subtropical regions

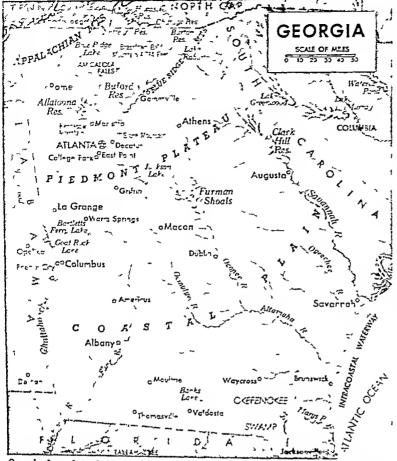
The state a rivers yield hydroelectric power and help sustain a high level of manufacturing activity Georgia ranks among the first four states of the Union in a number of cotton textile products. The state is also a ventable crossroads of the South the state the best ral and highway routes between New York and New Orleans crisscross those between Florida and the central western states These fol low natural routes that have long made Georgia a much traversed state Georgia also has a fine outlet for ocean borne commerce in the historic port of Savannah Cotton fuel oil and lumber are shipped to world markets from here Cane sugar is the largest import (see Savannah)

Three Diverse Natural Regions The land of Georgia slopes gradually from moun tains in the northwest to sea level in the southeast It is divided into three great natural sections—the northern Appalachian region the central Piedmont Plateau and the low Coastal Plain

The smallest of these sections is the Appalachian region often called the state e roof garden are many beautiful waterfalls esecades and winding streams set against forested hills and mountains Many spots have interesting caves. Near Cartersyille on the Etowah River is the Allatoona Dam completed in 1949 This section also has quiet valleys carpeted with pastures grain fields and orchards

The Appalachian region gradually gives way to the Predmont Plateau This is gently rolling country spotted with sociated hills In this section is Stone Moun-





Georgia slopes from the mountains to the sea. The Appalachian Mountains are in the northwest. In central Georgia is the Piedmont Plateau with most of the cities and farms. In the southeast is the low Coastal Plain with pine forests. Islands fringe the coast.

tain, 800 feet high and a mile in diameter. It is the largest granite dome in North America and is the site of an unfinished memorial to the Confederacy.

The Piedmont Plateau is Georgia's most densely populated section. It has most of the important cities and most of the cultivated land. It grows large quantities of cotton, corn, and other field crops.

The Piedmont ends at the fall line, where the rivers pour down rapids or over falls to the Coastal Plain. The wide and low plain occupies more than a third of the state. Here many of the rivers are large and deep enough for navigation. Here also are extensive sandy areas known as "pine barrens," where the famous Georgia pine grows in abundance. Many of these forested lands have been cleared and enriched with native marls and swamp muck to make excellent farming land. Many islands dot the Atlantic shore.

In the extreme southeast, extending into Florida, to the beautiful wilderness called Okefenokee Swamp. The Georgia portion covers about 700 square miles. This swamp has many kinds of trees and plants and

a variety of birds, fish, and other game. About 330,000 acres of the swamp are in a federal government preserve known as the Okefenokee National Wildlife Refuge. This region has long been a favorite of naturalists.

## Farms of Georgia

Georgia's most valuable farm product is cotton. It grows in almost every section of the state, from the northern valleys to the numerous islandalong the coast. Corn is next in importance. It also is grown practically everywhere. Peanuts are the state's third most valuable farm crop. Other important products are mill. hogs, tobacco, chickens, eggs and cottonseed.

Nearly all sections raise some fruit. Many peaches, water-melons, and cantaloupes are grown and shipped to northern markets. Because of its early growing season, Georgia is among the first states to supply these delicacies annually. The middle and southern sections produce sugar cane for syrup. Near the coast pecan trees yield a valuable crop. Raising cattle is increasingly important.

## Forests and Minerals

The state's vast forests, covering about 33,000 square

miles, are an important source of wealth. The Georgia pine yields many products. Its long slender trunk is good for furniture, building, pulp, and paper. Its bark is used in making charcoal, and both roots and bark are turned into lampblack. The sawdust is distilled into wood alcohol and creosote. The seed of the Georgia pine is fed to hogs. In addition, the sam of this valuable tree supplies turpentine and rosm for which Georgia is a leading state.

Although Georgia does not rank high in mineral resources, deposits of about 44 minerals have been found in the state. Clays (including fuller's earth), stone, and cement are the most important of these minerals. The state ranks first in output of kaolin, or china clay. It is noted for its fine quality white marb'e and its large granite quarries. Georgia also produces sand and gravel; tale, barite; iron ore; lime; and bauxite, for making aluminum.

## Manufactures and Cities

In the decade ending with 1950, manufacturing passed agriculture, forestry, and fishing as the leading occupation in Georgia. Both fields of employ-



GEORGIA (Ga) hamed a honor of Aing George II of England who in 1732 granted charter for colony to Englishmen led by James Oglethorpe N cknome As New York is the Em pure State so Georg a so the Em

p re State of the South for its size and rapid varied industrial greath Seal An arch with word Constitut on written on it supported by three pillars representing Wisdom

Justice and Moderation Motto Wisdom Just ce and Moderat on

flog For descript on and Ilustrat on see Flags Flower Cherokee rose Brd Brown thrash r Live oak Song Georg's -words Robe t Lo man mus c Loll e Belle Wyhe

#### THE GOVERNMENT

Cop tol Atlanta (sin e 1868) Representation in Congress Senste House of Representatives 19 Electoral votes 12

General Assembly: Senators 54 term, 2 years Representatives 205 term 2 years Meets 2d Monday n Jan in odd years seasion lim t. 70 days

Const tut on E ghth adopted in 1945 Proposed amend ments must be (a) passed by two-th rds majoraty of both legulative houses and (b) rat fied by major ty voting on amendment at popular elect on Gove nor Term 4 years May be re-elected 4 years after

serving a term Other Executive Officers Leutenant governor secretary of state attorney general treasurer comptroller neral comm se oner of agri ulture commissioner of

labor all elected terms 4 years Aud cary Supreme court-7 just see elected at large term 6 yra Court of Appeals-6 judges elected term 6 yrs Super or courts-159 m 35 pade at carcu ta 35 judges elected term 4 yrs Courts of ords

nary-one per county judges elected term 4 yrs County 159 count en governed by boards of commuss on ers numbering from 1 to 6 If no board exists county s governed by an ordinary corresponding to probate judge mother states Most boards and county officers elected

Mun c pal Mayor and council most common Voting Qualifications Age 18 (a nice 1943) residence in state I year in county 6 months literacy test



TRANSPORTATION AND COMMUNICATION Transported on Ra lreads 6 000 miles First ra lread Georgia Railroad (50 m les out of Augusta) 1837 reached Athens 1841 Rural roads 88 200 miles Air ports 114

Commun cut on Period cals 96 Newspapers 246 Pirst newspaper Georgia Gazette Savannah 1763 Radio stat ons (AM and FM) 96 first station WSB Atlanta livensed March 15 1922 Televis on stat ons 3 first stat on WSB-TV Atlants began operation Sept 29 1948 Telephones 717 400 Post offices 873

#### THE PEOPLE AND THEIR LAND

Populat on (1950 census) 3 444 578 (rank among 48 states-13(h) urban 453% rural 547%. Dens ty 58 9 persons per aquare mile (rank-24th state)

Extent Area 58 876 square miles including 393 square miles of water surface (20th state in a ze) Elevation Highest Brasstown Bald Mountain near

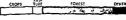
Blarsville 4 781 feet lowest sea level

Temperature (F) Average-annual 65° winter 49° spring 64 summer 80 fall 65 Lowest recorded (near Lafayette Jan 27 1940) highest recorded 112° (Louisv lle July 24 1925)

Prec a tot on Average (inches)-summal 50 winter 13 spring 12 summer 16 fall 9 Varies from about 76 in northeast to about 46 in east central

Notural Features From the northwest corner the land gradually slopes to sea level fo ming thee separate regions the Appalachian Mounta nam extreme northwest the densely populated P edmont Plateau ly ng between the Appalachians and the fall I no the Coastal Plan region comprising the southern third of state Prue pal r vers Altamaha Chattahoochoe Flint Ozeechee Oconce Ocmulgee St Marya Savannah Land Use Cropland 25% nonforested pasture 7% fo est 56% other (roads parks game refuges waste-

land (it es etc.) 12% TURE CEOPS



Note at Resources Agreeultural-mild climate fert la so I sustable for many kinds of crops Industrialdepos to of clay stone streams for water power forests fahenes Commercial port of Savannah bistorie and scenie places attract vacat onists

#### OCCUPATIONS AND PRODUCTS What the People Do to Earn a Living



Felds of Emp oyment	Number Employed	of Total		
Manufe tur ng	89 193	93 D		
A - cultures fo entry and fishery	977 904	29 1		
Wholesale and teta I trade	01 704	16 1		
Pe sonal se vices (note) domest launder ng e c) Profess onal services (med al legal	1°2 64	9 8		
-Acret onal etc)	8 125	6.5		
Transportst on commun at on and				
other public tital t es	73 955	6.1		
Construct on	71.865	57		
Committeet	48 450	39		
E seems neurance and real estate	30 199	24		
Don oren and repai services	23 135	18		
Amusement ree es on sad re ated		1		
servi es	9 755	07		
M = #F	504	04		
We kers not accounted for	18 991	15		
Tatal employed	2 254 935	100		



What the People Produce

A. Manufactured Goods (Rank among states—19th) Value added by manufacture\* (1952), \$1,355.318,000

Leading Industries in 1947	Value Added by Manufacture	Rank among States
TEXTILE MILL PRODUCTS	328,023,000	6
Cotton broad-woven fabrics; yarn		
and thread mills; hostery mills;		
rayon broad-woven fabrice	100 440 000	01
FOOD AND KINDRED PRODUCTS	133,445,000	21
Bakery goods; soft drinks; flavor-		
ings; meat racking; confectioneries	CC 4CC COO	6
LTURER AND PRODUCTS	88,455,000	O
Sawmills and planing mills; wood- en bouse; wood preserving		
CHEMICALS AND ALLIED PRODUCTS	77.043,000	17
Gum and wood chemicals; ferti-	11,020,033	14
lizers: vecesable and animal oils		
APPAREL AND RELATED PRODUCTS.	76,084,099	10
Men's and boys' furnishings	. 0,002,000	
PAFER AND ALLIED PRODUCTS	54,207,000	17

\*For explanation of value added by manufacture. \*\*\* Centus



B. Farm Products (Rank among states-17th) Total cash income (1952), \$652.898.000

Products	Amount Produced (10-Year Average)	Rank within State*	Rank among Statest
Cotton lint	735,000 bales :	1	5
Сотп	46.792,000 bg.	2	18
Peanuts	691,099 lbs.	3	1 1
Нор	363,231,000 lbs.	4	14
MEL	535,000,000 ots.	5	29
To5270	99,527,000 lbs.	6	. 6

\*Rank in dellar value tRank in units produced



C. Fish (Rank among states-16th) (Marine waters and coastal rivers, 1950), catch, 17.351.090 lbs.: value, \$3.5\$4,009

D. Minerals (Fuels, Metals, and Stone) Annual value (1951), \$48,509,099

Rank among states-32d

Minerals (1951)	Amount Produced	Value
Chy	6,026,000 tons	\$23,099,099 15,765,099

\*Coment ranks 3: in valve; exact figures not available

E. Lumber (Rank among states-5th) 1,689,000,000 board feet (5-year average)

F. Trade

Trade (1948)	Sales	Rank among States
Wholesale Retail, Service.	2,111,539,000	1 <u>4</u> 19 17

## EDUCATION

Public Schools: Elementary, 1,858; secondary, 1,255. Compulsory school age, 7 through 16. State Board of Education, 10 members (one from each congressional district), appointed by governor, 7-year terms. State supt. elected, 4-year terms. County supts. elected, 4-year terms. City

boards of education usually 5 members, 3-year terms City supts, appointed by city boards, 1 to 3-year terms

Private and Parochial Schools: 72.

Colleges and Universities (accredited): College-white, 17; Negro, 9. Junior colleges, 17. The state university system includes 18 divisions, of which three are Negro colleges. The largest state universities are University of Georgia, Athens; Georgia Inst. of Technology, Atlanta; University System Center. Atlanta: Georgia State College for Women, Milledgeville.

Special State Schools: Georgia Academy for the Blini, Macon; Georgia School for the Deaf, Cave Spring: Georgia School for Mental Defectives, Gracewood; North Georgia Vocational School, Clarkesville; South

Georgia Trade School, Americus.

Libraries: City and town public libraries, 37; 23 regions library systems serve 57 counties; 83 independent county library systems. Division of Instructional Materials and Library Services, State Dept. of Education, aids in developing public and school library series. Outstanding Museums: Children's Nature Museum, High Museum of Art, Atlanta; Old Pirates' House, Telfair Academy of Arts and Sciences, Savannah.

## CORRECTIONAL AND PENAL INSTITUTIONS

Ga. State Prison, Reidsville; Ga. Training School for Boys, Milledgeville; Ga. Training School for Girls (white), Atlanta; Ga. Training School for Girls (Negro), Macon; Ga. Industrial Inst., Alto.

## PLACES OF INTEREST\*

Allatoona Dam—on Etowah R. near Cartersville and (9). Andersonville Prison Park-site of Camp Sumter, lengt Confederate prison in Civil War (24).

Athens—pre-Civil War houses; Univ. of Georgia (12). Atlanta—the Capitol; immense painting of battle of Atlanta in Cyclorama Building; Crypt of Civilization s:

Oglethorpe University (see Atlanta) (10)-Augusta—site of Fort Augusta (1735) marked; 76-ft. Com federate Monument: Augusta National Golf Club, where President Eisenhower vacations (see Augusta) (14).

Chickamauga and Chattanooga National Military Parkcommemorates battle of Chickamauga (1863) (2).

Clark Hill Dam-on Savannah River near Augusta: for power and flood control; 36-mile-long reservoir (14). Columbus-Fort Benning, U. S. Army Infantry training center, nearby (23).

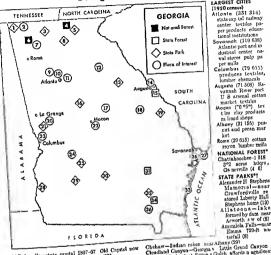
Fort Frederica National Monument—ruins of fort built in 1736 as defense against Spanish (33).

Fort Pulashi National Monument—well-preserved ich built 1829-17 to guard mouth of Savannah River (27)-Ida Cason Gardens—near Warm Springs (29).

Kennesaw Mt. Nat'l Battlefield Park-near Marietts: site of Sherman's assault on Confederate forces (9). Louisville state capital (1795-1897); Slave Merke: built before 1800 remains intact (18).

Macon-replica of Fort Hawkins (1896) on original site: home of Sydney Lanier, poet; Ocmulgee National Mozument-Indian mounds, Indian Council House (22)-

\*Numbers in parentheses are keyed to map.



Milledgeville-state capital 1807-67 Old Capitol new occupied by Georgia Mil tary College (17) New Echota Marker-northeast of Calhoun s to of last Cherokee capital in state (7)

Okerenokee Swamp Park - jung et ke awamp (36) St Simon Island-one of the See Islands famous as vacat on land resort of Sea Island on east shore (33)

Savannah-art collections in Telfair Academy of Arts and Sciences gardenlike beauty in nearby Bonaven ture Cemetery Bethesda Orphanage founded in 1740 restored Trustee s Garden Village (see Savannah) (26) Stone Mountain-large granite dome gite of planned

Confederate Memorial partly carved (11) Warm Springs-foundation for treatment of infantile paralysis F D Roosevelt s Lettle White House (29)

### STATE FORESTS\*

Baxley (Appling Co )-1 900 acres (31) Gewn Nixon (Richmond Co )-100 seres (15) Lowndes (Lowndes Co )-15 acres near Valdosta Milledgeville (Baldwin Co )-690 acres ne of Mass Ocmulgee (Telfair Co )-120 scres northwest of (31) Wayeross (Ware Co )-37 731 scres (34) Numbers a parentheses are keyed to map-

#### LARGEST CITIES (1950 census)

Atlanta (331 314) state can tal railway center textiles paper products educational institutions

Sayannah (119 638) Atlantic port and in dustrial center naval stores pulp pa per mile Columbus (79 611)

produces textiles. lumber chemicals Augusta (71 508) Savannah River port

U S arsenal cotton market textiles Macon ("0 "5") tex t les clay products

rs lroad shops Albany (31 155) pesnut and pecan mar ket Roma (29 615) cotton

rsyon lumber mills NATIONAL FOREST Chattahoochee-1 518 3°2 acres bdqrs, Ga nesville (4 6)

STATE PARKS" Alexander H Stephens

Mamorial-near Crawfordville re atored Liberty Hall Stephens home (13) Allatoons - lake formed by dam near Acworth a w of (8) Amicalola Falls—near Emms 729-ft wa-

terfall (8)

natural lookout at Sitton's Gulch affords n agnificent view from 2 000-ft altitude near Trenton (1) Crooked River-near Kingsland water sports e of (36)

Fort Mountain - near Chatsworth stone fort (1539) beheyed to be Indian defense against De Soto (3) Frankl a D Roosevelb-near Chipley beautiful view of

Pine Mountain Valley bell-shaped swimming pool (21) Georgia Veterans Memorial-lake near Cordele (25) Hard Labor Creek-Rutledge putdoor sports w of (13) Indian Springs mineral springs attract many health seckers picnic groves and hixing tra is (16)
Jefferson Davis Memo ial-Trwinville marker where

Dayis was captured in 1805 Confederate Museum (30) Kolomoki Mounds—unportant to archeologista because of the Indian relics they conta n near Blakely (28) Laura B Walker-prar Wayeross group camp ng (3°) Lattle Ocmulger near VicRac outdoorsports ne of (30) Magnolia Spring nine in lion gallons of water flow

from spring daily swimming pool near Millen (19)

Vogel-primitive widerness in Blue Ridge Mountains Lake Trablyta Nottley Falls many foot trails (5) (There are 21 state parks in Georgia 17 are 3 ven here

THE PEOPLE BUILD THEIR STATE

1540—De Soto marches from Florida through part of Georgia.

1560-Tristan de Luna searches for gold in north Georgia.

1566—Pedro Menéndez de Avilés builds fort on St. Catherines I.; claims area for Spain; Indians drive out Spanish after 2 years.

1663—Charles II of England grants present territory of Georgia to "fords proprietors" of Carolina.

1721-English build first fort (King George).

1721—English blind first fort (King George).1732—George II of England grants charter giving imprisoned English debtors right to settle in Georgia.

1733—Gen. James Oglethorpe arrives with 120 colonists, February 12, founding Savannah. Creek Indians sign land treaty with Oglethorpe.

1735-Importation of slaves into colony prohibited.

1736—John and Charles Wesley arrive at Savannah to preach Methodism; return to England, 1738. Oglethorpe establishes fortified town of Frederica.

Oglethorpe establishes fortified fown of Frederica.

1740—Georgia supports Britain in war with Spain.

1742—General Oglethorpe's troops defeat Spaniards at battle of Bloody Marsh on St. Simon Island.

1749-Importation of slaves becomes legal.

1754—Georgia becomes royal province.

1763—Treaty of Paris gives Georgia land west to Mississippi R., north to Carolina, south to St. Marys, Flint, and Chattahoochee rivers and 31st parallel.

1775—First provincial congress meets in Savannah: Council of Safety sends delegates to Continental Congress.

1777-First state constitution ratified.

COUNTIES

1778—British troops capture Savannah, December 29. 1762—British troops leave Savannah; city again becomes

seat of state government. 1785—U. of Georgia is first state university chartered in

America, January 27; opens in Athens. 1801.

1786—Augusta becomes temporary state capital.

1787—Eastern boundary with South Carolina fixed along Savannah, Tugaloo, and Chattooga rivers.

1788—Georgia is fourth state to ratify U. S. Constitution. 1795—Capital moved to Louisville. Legislature grants

—Capital moved to Louisville. Legislature grants western lands to four land companies in statute later called "Yazoo Fraud"; act repealed in 17%.

1802—State cedes western lands to U. S. for \$1,250,000; accepts Chattahoochee River as western bonndar.

1804—Milledgeville becomes state capital.

1815-Bank of State of Georgia chartered.

1819—Sarannah, first steamship to cross Atlantic (with aid of sails), sails from Savannah, May 22.

1828—Indian conflicts follow gold discovery in Cherokee territory; Indians removed from state 1835-38.

1861—Georgia secedes from Union, January 19. Alexander H. Stephens, born in Taliaferro Co., elected vice-president of Confederate States of America.

1863—Federals defeated at Chickamauga, September 20.
1864—Sherman burns Atlanta, November 4, begins
march to sea; he occupies Savannah, December 21.

1865—Jefferson Davis, president of Confederate States, captured by Federal forces near Irwinville.

1868—Georgia ratifies 14th Amendment; Federal troops leave state; Atlanta named state capital, March II.

1870—Georgia readmitted to Union, July 15.

1876—Joel Chandler Harris, born in Eatonton, joins Atlanta Constitution; begins 'Uncle Remus' stories. 1888—Thomas E. Watson, born in Columbia Co., elected

to Congress; is Populist vice-presidential candidate, 1896, and presidential candidate, 1904.

1901—Federal penitentiary opened in Atlanta. 1922—Fort Benning (infantry-training center) opened.

1937—Nargaret Mitchell, born in Atlanta, wins Pulitzer prize for Civil War novel 'Gone with the Wind.'

1943-Voting age lowered to 18.

1945—New state constitution adopted; poll tax abolished.
1949—Allatoona Dam on Etowah River completed for power and flood control.

1951—State passes 3% sales and use tax; bans wearing in public of masks such as Ku Klux Klan uses.

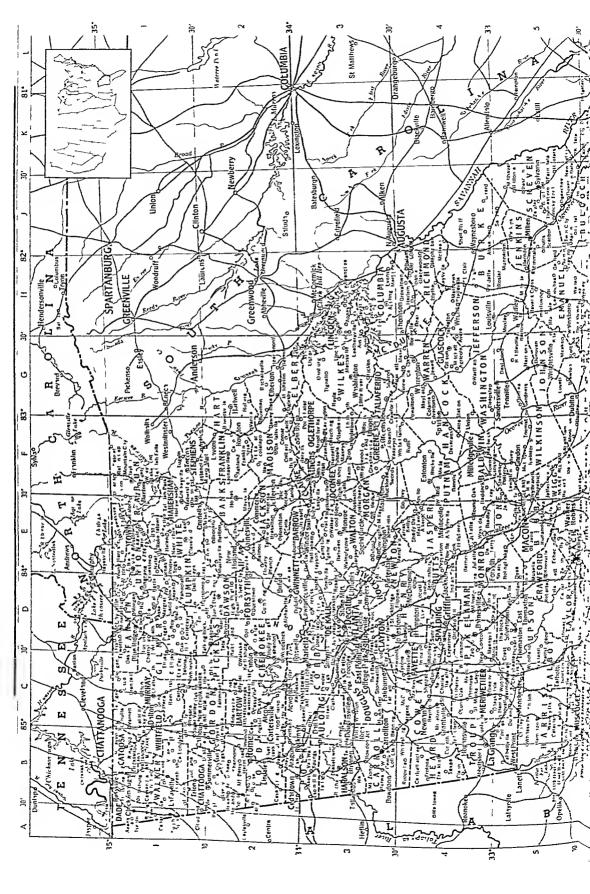
1952—Annexation by Atlanta trebles its area. Savannah dedicates new port facilities. Clark Hill Dam on Savannah R. completed; generates power, 1953.

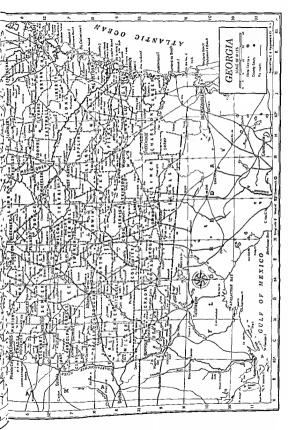
## INDEX TO THE MAP OF GEORGIA

COL	INTIES		Clayton	22,872	D 3	Gordon	18.922	C 2	Madison	12,238	F 2	l Stewart		Co
			Clinch	6,007		Grady	18,925		Marion	6,521	C 6	Sumter		De
Appling	14,003	H 7	Cobb	61,830		Greene	12,543	F 3	Meri-	-,		Talbot	7.657	Co
Atkinson	7,362		Coffee	23,961	GS	Gwinnett	32,320	D 2	wether	21,055	C 4		4,515	G 3
Bacon	8,940	G 7	Colquitt	33,999	ES	Habershan	16,553	El	Miller	9,023	C 8		15,939	J 6
Baker			Columbia	9,525	H 3	Hall	40.113		Mitchell	22,528		Taylo:	9.113	D 5
Baldwin	29,706	F 4	Cook	12,201	FS	Hancock	11,052		Monroe	10.523	E 4		13,221	G Z
Banks	6,935	E 2	Coweta	27.786	C4	Haralson	14,663	B 3	Mont-	,		Terrell	14.314	D 7
Barrow	13,115	E 2	Crawford	6,080	E 5	Harris	11,265	C 5	gomery	7,901	G 6		33,932	Εā
Bartow	27,370	C 2		17,663		Hart	14,495		Morgan	11.899	F 3		77.645	E S
Ben Hill	14,879	F7		7.364	A 1	Heard	6,975		Murray	10,676		Toombs	17.352	ΗЬ
Berrien	13,966	F8	Dawson	3,712	D 2	Henry	15,857		Muscogee		C 6		4,503	E 1
	114,079	E 5	Decatur	23,620	C9	Houston	20,964	E 6	Newton	20,185	E3		6.522	G 6
Bleckley	9,218	E. E.	De Kalb	136,395	D3	Irwin	11,973		Oconee	7.009	F3		49.841	B 4
Brantley	6,387	7.8	Dodge	17,865	F 6	Jackson	18,997		Oglethorpe	9.938		Turner	10,479	E?
Brooks	18,169	E 9	Dooly	14,159	E 6	Jasper	7,473	E 4	Paulding	11,752	C 3		8,305	r ə
Bryan		Kε	Dougherty		D 7	Jeff Davis	9.299		Peach	11,705		Union	7,318	EI
Bulloch	24,740	10	Douglas	12,173	C 3	Jefferson	18,855		Pickens	8.855		Upson		D 5
Burke	23,458	J 4	Early	17,413		Jenkins	10,264	J5	Pierce	11,112		Walker	38,195	BI
Butts	9.079	£ 4	Echols	2,494	G 9	Johnson	9,893	G 5	Pike	8,459		Walton	20,230	Ł
Calhoun	8,578	0.7	Effingham		K 6	Jones	7,535	E 5	Polk	30,976		Ware	30,259	H 8
Camden	7,322		Elbert	18,555	G 2	Lamar	10,242		Pulaski	8.805		Warren	8,779	G 4
Candler	\$,063	11 0	Emannel	19,789		Lanier	5,131	F8	Putnam	7,731		Washing-		
Carroll	34,112 15,146	B 3	Evans	6,653	J 6	Laurens	33,123	G 6	Quitman	3.015	B 7			G 4
Catoosa Charlton			Fannin	15,192	D 1	Lee	6,674	D 7	Rabun	7.424		Wayne	14,245	37
Chatham	4,821	E 6	Farette	7,978	C 4	Liberty	8.414	J 7	Randolph	13,804		Webster	4,051	C
Chattahoo		D 0		62.599	B 2	Lincoln	6,462	H 3	Richmond	108.876	H 4	Wheeler	6 712	GU
Charman	12,149		Forsyth Franklin	11,005		Long	3,595	J 7	Rockdale	5.464	D 3	White	5,951	EI
Chattoora			Fulton	14.446		Lowndes	35,211		Schley	4,036		Whitfield	34,432	B 1 F 7
Cherokee	20.750		Gilmer	473.572	n 3	Lumpkin	6,574	D 1	Screven	18.000	J 5	Wilcox	10.167	
Clarke	36,550		Glascock	9,963		McDuffle	11,443	H 4	Seminole	7,904		Wilkes	1-2	G3
Clay	5,844		Glynn	3,579 39,046		McIntosh	6.005	K 7	Spaulding	31,045	D 4	Wilkinson	9.751	F5 EE
-	3,547	D 1	بسريه ۽	-J.U40	18	Macon	14,213	D 6	Stephens		F 1	Worth	19,357	r_ c
F-7 47											_			

### GEORGIA

					GEOR	GIA							
CITIES AND	TOWNS	Blitchton Blue Ridge Blue Ridge Blufton	350 F 1718 I	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	lermont leveland	323 549 373	E 21	East Ellijay East Julierto East Point 21	549 6 303 1	1 4 3 5 5 F 1 F 6	Graymont (Twin City) Grayson	1 018	П 5
		Blue Ridge	1718 I	įįį	limax linchfield	200	EDE JAPKEH11FF	East Point 21	080 G		Grayson Grayavillo		H 5 E 3 B 1
Anron Abac Abbac Abbattle Abbattsford Acree Acworth Adaireville Adaireville Adrau Afron Agree Agricola Alkentori		Elun Illundale	244 6 150 1	1		25	76	E Thomaston 3 Eastanolice Eastman 3	225	F1 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6 F6	Greenbush Greenbush	150	BDFCFFFDF6
Abac Abba	F 7	Hirtha	263 1	3 0	iondland lyattville	100 75	ŷ i	Yastville	96 749 56 1	3	Greenaboro Oreenville	2 639 733	FS
Abbeville	890 F7	Bogart Boles		3 8	iyo	150	1.7	Echecoppes	56 1	E 5	Gregga Gresbamville	100	Ϋ́
Acree	40 B4 225 D7 1466 C2	Bolugbroke Bolton	2000 I	2 0	obbtown	2 VR 128	H 6		300 J 247 (	5 6	Greshamville Gresston Griffin	100 200 13 982	F 6
Acworth Adairsville	916 02	Boneville			obert	3 357	F 2	Edith		10	Griffin Griewoldvillo Grovania		D 4
Adel Adesteville	916 C 2 2776 P 8 75 E 4	Boston Bostwick Bowdon	1 035 1 247 1 155	3 6	orbren offee officten	200	F6 H7 C6	Egypt Elberton 6 Eldora	772	67 67 67 68 67 68 68 68 68 68 68 68 68 68 68 68 68 68	Grovania	225	E 6
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# GEORGIA - Continued

ment engage about one out of every four workers in the state

Leading manuface tures include cotton broadwoven goods and cotton varn. Oth er important textile products are hosiery and rayon and woolen fabrics Georgia is also noted for its sawmills and planing mills, gum and wood chemicals furniture and men a clothing

The largest of Georgia's cities is its capital Atlanta An inland croseroads st the southeastern end of the Appelachian Mountaine, it is an important trade manufacturing and transportation center It is noted for its historical associations

(see Atlanta)

The state s second city and main port is Savannah near the mouth of the Sayannah River This beautiful city is the oldest in the state and rich in historic interest It is also a busy south Atlantic port (see Savannah) Farther up the river is Augusta It has large cotton and lumber markets and many cotton mills Within 25 miles ere the vast Savannah River Plant of the Atomic Energy Commission in South Caroline the United States Army's Camp Gordon and Clark Hill Dam which provides a nine-foot channel to the city (see Augusta) Across the state is Columbus, an industrial center on the Chattahooehee River

About 100 miles southeast of Atlanta and only six miles from the geographical center of the state is Macon A great dam on the Ocmulgee River provides hydroelectric power for the city s cotton knitting, lumber, and other mills Macon was the home of Sidney Lamer well known Southern lyne poet It is the seat of Wesleyan College one of the first women's colleges in the United States

History of Georgia About 1540 Hernando de Soto and his company of adventurers, lured by tales of fabulous wealth in the New World passed through what is now Georgia on their way to the Mississippi (see De Soto) In 1566 Menéndez de Ayılés landed on St Catherines Island Thus Georgia became part of the vast territory which Spain claimed During the next two centuries, the Spaniards established only a few scattered forts along the coast They had to defend their title constantly against the claims of the French in Louisiana and the English in the Carolinas



inished in Georgia marble. The structure was completed in 1889. In the foregreen equestrian statue of Gen. John B. Gordon, first governor to occupy the Capitol

In 1732 George II for whom the state was named, granted a charter to a group of wealthy Englishmen headed by Gen James Edward Oglethorpe They planned to found a colony as a haven for debtors who were crowding Eoglish prisons and for persecuted Protestants in Germany and Austria. The colony was also to serve as a defense area against the Spansards in Florida and the French in Louisiana

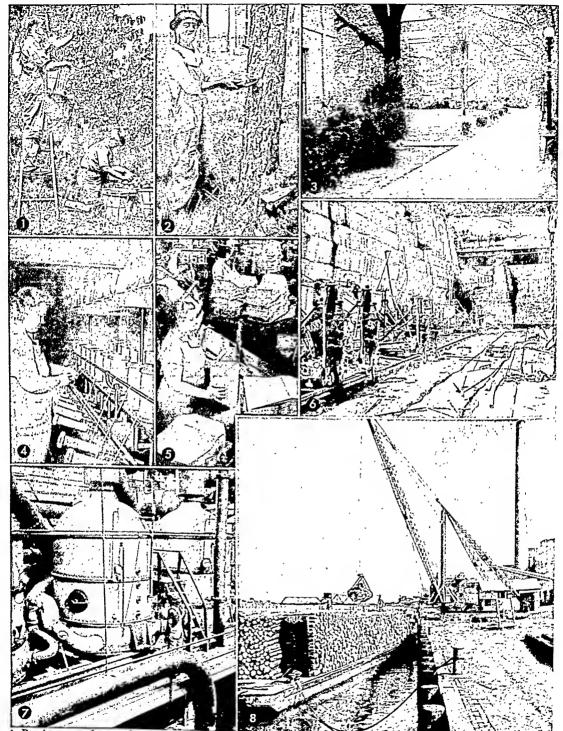
In the spring of 1733 General Oglethorpe, with about 150 followers sailed up the Savannah River to Yamacraw Bluff Here he built Fort Savannah and founded the colony of Georgia. It was the last of the 13 colonies set up by England Soon afterward, the group was joined by bands of Protestant refugees. notably the Moravians and the Salzburgers Settlements were made at New Ebenezer, New Inverness. Frederica and Augusta

In 1734 Orlethorpe went back to England and in 1736 returned to Georgia. He brought with him more colonists including 150 Scottish Highlanders

In July 1742 Spaniards from Florida landed 3 000 men on St Sunon Island Their aim was to destroy the settlement at Frederica They were defeated at the battle of Bloody Marsh by Oglethorpe Still outnumbered by the invaders he cleverly informed the enemy that a British fleet was on its way to attack St Augustine The Spaniards returned to Florida

The Georgia settlers cultivated silkworms hemp, grapes, and ohves for England But the colony did not thrive because the chinate was warm and slaves were prohibited To save the colony, the trustees allowed slaves to be brought in beginning about 1749

# GLIMPSES INTO THE HEART OF GEORGIA



1. Peaches are a famous Georgia crop. 2. In the pine forests turpentine seeps into the pans after the trees have been chipped. 3. The first state university to be chartered in the Union is at Athens. 4. Georgia's cotton supports a growing textile industry. 5. Paper mills of Savannah, fed by the pulp of Georgia's pine forests. 6. The famous quarry of fine marble near Tate. 7. From the came fields comes the sugar for this refinery at Savannah. 8. Unloading logs from barges shows the importance of river navigation in the commerce of the state.

During these uncertain years, the Indians remained friendly until 1751. Then Mary Musgrove, an Indian woman who had acted as an interpreter for General Oglethorpe, marched against Savannah with a large band of Indiana to demand the return of certain lands The uprising was quelled by William Stephans, Oglethorpe's successor

After the trustees surrendered their charter, the colony in 1754 became a royal province. It prospered under the liberal rule of its governors, John Reynolds, Henry Eilis, and James Wright

During the American Revolution, Georgians played a conspicuous part, rather because of their sympathy with the northern colonies than hecause they were dissatisfied with British In 1778 Georgia hecame the rule chief battlefield when the British, after failing to conquer the northern col-

onies, tried to gain a footing in the South The British routed the Americans under Gen. Robert Howe and seized Savannah The city became the headquarters of the British in the South Georgis adopted its first state constitution in 1777

and it was the fourth state to ratify the federal Con-Trouble with the Creek and Cherokee Indians, who resented the seizure of their lands, was s problem of the new state In 1802 Georgia, whose territory then included most of the present states of Alabams and Mississippi, sold to the federal government all its lands westward from the Chattahoochee to the Mississippi River The federal government negotiated Indian claims in 1832-35 By 1833 all Indians had been moved to distant reservations.

### Georgia in the Civil War

At the beginning of the secession movement, Georgia was divided between Unionists, headed by the able Alexander H Stephens, and those whn wished to leave the Union (see Civil War, American). When Abraham Lincoln was elected president, the state voted overwhelmingly for secession, Jan 19, 1861, and declared itself a free republic In 1863 it was the scene of the hard-fought battle of Chicksmauga near the Tennessee border In 1864 General Sherman cut his way across Georgia, captured Atlanta, and then marched to the sea (see Sherman) After peace came, Georgia recovered slowly from

the war (see Reconstruction Period) It was readmitted into the Union on July 15, 1870 (For additional history, see chronology in Georgia Fact Summary.) Higher Education in Georgia

All state-supported institutions of higher learning comprise the University System of Georgia The eight white senior colleges are University of Georgia at Athens, the nation's oldest chartered state university (1785), University System Center, Atlanta, nationally known Georgia Institute of Technology,



a is troical of Georgia's coast with Spanish moss, frame the grass-filled savanna on each side of the river.

Atlanta, Medical College of Georgia, Augusta, North Georgia College, Dahlonega, Georgia State College for Women, Milledgeville, Georgia Teachers College, Collegeboro, and Valdosta Stata College, Valdosta, There are also five white jumor and three Negro senior colleges Near Atlanta are two leading private schools, Emory University and Oglethorpe University (See also United States, section "The South ") GEORGIA. For more than 2,000 years, proud, courageous Georgia, also called Sakartvelo, maintained its own line of kings. Then in 1801 it was sinnered to Russia, to which it had appealed for protection from the Turks; but in May 1918, after the Russian revolution, it again declared its independence In 1922, with Azerbaidzhan and Armenia, Georgia formed the Transcaucasian Socialist Federative Soviet Republic When this was abolished in 1936. it became a constituent republic (Georgian Soviet Spenalist Republic) of the Soviet Union The Georgians are a handsome people of ancient white stock (see Caucasus Mountains)

Georgia hes on the Asiatic side of the Caucasus Mountains, bordering on the Black Sea The capital as the ancient city of Thilisi (Tiflis), with a population of 540,000 Here are factories and important schools, notably the state university. The oil pipelines and the railroad from Baku to Batum, chief port of Georgia, pass through Thilisi

Georgia leads the world in production of high-grade manganese ore It also mines coal, iron, and copper. Its maportant farm products are corn and other cereals, cotton, fruit, tobacco, and tea Cattle are fattened in its rich meadows, and silkworms in its mulberry plantations Fine tumber is cut from the forests Power for industry comes from hydroelectric plants on the Kura River. Area of Georgia, about 27,000 anuare miles, population (1947 est.), 3,555,000.

GERANIUM. Botanists tell us that the red, white, or pink "geranium" plants we grow in summer gardens and on window sills really are not geraniums at all. They are pelargoniums. But real geraniums are found all over our woods and thickets. They are graceful wild flowers with five-petaled heads on long, hairy stems. Many of them look like wild roses. (For illustration in color, see Flowers.) We call them crane'shills or wild geraniums. The spotted crane's-hill is about two feet high and each of its numerous branches bears two light purple flowers about an inch across. Its bitter rootstock is used as a medicine. Another common species is herh Robert, a plant with dainty, little, light purple flowers streaked with red, found in damp shady woods and ravines.

The house plants we call "geraniums"—the pelar-

goniums-belong to the same family but differ greatly from the true geranium in appearance. They are much prized for their large, irregular, variously colored flowers and their leaves that vary so in shape, texture, and marking. Geranium oil, a substitute for attar of roses, is distilled from certain species growing in Algeria and in Cape of Good Hope, where most of the plants of this genus have come from.

Both the geranium and the pelargonium belong to the plant family Geraniaceae. The geraniums number about 160 species, and are dispersed throughout the temperate regions of the world. The pelargoniums—the commonest of whose 200 species are the cultivated ivy geranium (Pelargonium peliatum), the rose geranium (Pelargonium graveolens), and the nutmeg geranium (Pelargonium odoratissimum)are perennial herbs or shrubs.

bet is simply a variation of the Roman, and any

# The Language of LUTHER, GOETHE, and SCHILLER

MARTIN LUTHER

His Translation of the Bible Fixed the Standard of

SERMAN LANGUAGE AND LITERATURE. Rough 🗸 and guttural though German may be, it somehow lends itself naturally to poetry. While German prose is often inclined to do anything but come "trippingly

on the tongue," the best German verses are true music. They are alive with sincerity, they speak directly and unmistakably to the human soul, they strike deep to the very elements of life. And much of this wild-flower charm is apparently due to the vital quality of the language itself.

When we first meet with the Germans. or Teutons, about the beginning of the Christian era, they form three distinct groups with corresponding tonguesthe East Germanic or Gothic, the North Germanic or Scandinavian, and the West Germanic, from which originated primitive German, English, Dutch.

etc. This primitive German continued to split up into dialects as the tribes settled permanently in various

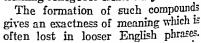
SCHILLER

districts; but the chief dialects were the High German of the mountainous region of central and southern Germany, and the Low German of the low land country in the north. High German won out over the dialect of the plains, and it is High German which is the official and literary language of Germany today.

German is really a simple and direct language, although it may present a

formidable appearance to the beginner. The first difficulty lies in the old "Gothic" characters, in which most German books are printed. This alphaword written in the former can be reproduced letter for letter in the latter script. Next, the beginner is struck by the enormous length of many German

But these are due to the ease words. with which compounds are formed, and when such words are split up into their several parts, they prove not only easy to understand but have a remarkable gift of expression. Thus, the word "Volksschullehrerseminar" looks almo-t hopeless with its 23 letters, until we divide it thus: "Volks-schul-lehrer-seminar." Then we discover by translating it hit by bit that it means "public-schoolteachers' seminary," or, in other words, a training college for elementary teachers.



And when we add to this the practice, so common in German syntax, of reserving the verb or part of the

verb for the end of the sentence, thus holding the reader's attention suspended until the whole of the thought has been expressed, we realize why German is so valuable a language for scientific descriptions of all sorts.

The Roman historian Tacitus, writing in the year 98 A.D., tells us that already the German barbarians of that period had a poetry of their own.

A Sparkling Poet and It of Wit and Irony.

The warriors would advance to battle, he says, singing hymns to Thor, the god of thunder, their shields held before their mouths to clang out a greater volume of sound And ever since no most ter what refinements or complex ities have developed in German literature there still remains in it this martial clang of shelds the distant thunder of tribal rel mon a hard sonorous muse larger and louder than life Even tle sweetest of their folksones have something at once vigorous and dark running through them

For a fong time this ancent poetry remained unwritten or if tragments of it were carved non and then in the old Run c all habet. on wooden staffs and metal tablet it was soon lost or at best re-

mained but fragments

Not unt I the 4th century do 1 e find a book written in a Teutonie tongue and by that time it treated not of the go i Thor but of Christianity The book was a translat on of the Bible made tw Ulfilas the native mesonary to the Gothe In order to make this translation Illifias was obliged first to invent the Gothic alphabet comb ning Greek Lat n and Runse letters to do so The tonene of those ancient Goths as we here find it possessed much of the roll ing beauty and expressive tough ness of the German language today

But though Illslas began the conversion of the Germans to the Christian rel gion their poets con timued for centuries to sing of

the old gods of Brunhild and Gud run and the flying Valkyrs as well as of mighty historic figures such as Attila

(Etzel) the Hun The Nibelungenhed of the 13th century is the most famous of these wild old dreams of gods and heroes and it has been the source of much modern German literature like a great changeless lake of rugged beauty and violent storms from which tr ckle delicate but more trans ent streams

A ighter note however tankled along bes de these resounding ep cs the mus e of the m nnesongs or the love lyries of romantic knighthood These dw miled out finally in the wholly mechanical mastersongs composed by rule rather than by inspiration and turned out like factory goods Yet the same period (15th and 16th centuries) in which these stiff and dreary mastersongs were being manufactured was the very heyday of the del ghtful German folksongs simple ab ding music by poets whose names are unknown



About this time also German prose began to deselon and blewise German drama chiefly in the hands of the clergy Church plays grew into great and salemn spectacles of which the celebrated Passion Play of Oberammergau is an impressive survival. And when the Reformation came in the church religion found even more beautiful expression in the fine old

> hymns of Mart n Luther But it was Lather's translation of the B ble which had the most important effect. This did for the German language what the works of Dante Petrarch and Boccaccio did for Ital an or what the King James Bible did for English It fixed the standard of the Linguage in the midst of a confus on of dialects Modern Ger-

man dates largely from Luther s works As the years nent on religious durates became angrier the Thirty Years War (1618-1648) broke out and the I ght of literature vanished in its horrors.









NIETZSCHE Philosopher of the Superman



SPENGLER
Philosopher Who Influenced Nazi Thought



HAUPTMANN Creator of Realistic Drama

National feeling decayed, and a weak and war-torn generation imitated French thought and custom in almost every field of activity.

## The Rebirth of German Literature

Not until the time of Frederick the Great (1712-1786) did German literature flourish again. Frederick limself was contemptuous of German writers. He preferred the French style of writing, and he honored the French writers, notably Voltaire, and such Englishmen as John Locke. But he did give Germans as sense of pride and independence, and gradually German writers broke away from French and English models.

Frederick began his reign in 1740. About the same time German literature began a golden age that lasted for a century. Klopstock, in his epic poem 'Der Messias' (The Messiah) and in his odes, introduced a new poetic language while still maintaining classic forms. Lessing, critic and dramatist, preached the harmony of form and content. He abandoned long, gusty descriptions and high-soaring allegory. His play 'Miss Sara Sampson' was the first German tragedy to introduce middle-class characters. His 'Nathan the Wise' spoke bravely for understandings between different religions. Wieland was an epic poet and novelist. He pioneered free expression of emotion and edged in a new and neater wit.

## A Literature of the People

These three writers, and others, were still guided by classic models and by the literary precepts of Aristotle's 'Poetics'. But for some time the ways of the world had been changing radically, and literature at last caught up with the change. A real middle class of people had already formed, and they wanted books, poems, and plays that expressed their own thoughts and feelings. The influence of Jean Jacques Rousseau was strong (see Rousseau). This French philosopher preached the dignity of the "natural man" and the rights of the individual. Germans received his ideas with enthusiasm.

Aided largely by the critical writings of Herder, Rousseau's theories produced in Germany the Sturm und Drang (Storm and Stress) movement. People began to talk of the perfect freedom of the individual and to rebel at tradition and authority. In France

the movement led to revolution, but in Germany it had no political consequences.

In German literature, however, the effect was enormous. Goethe, the greatest of German authors, wrote several novels emphasizing this theme. Such books of his as 'The Soriows of Young Werther' and 'Wilhelm Meister' tell of the struggles of young men for self-expression and of their emotional torments in first love affairs. Schiller, second only to Goethe among German writers, wrote in similar vein. (See also Goethe; Schiller.)

But in the work of lesser authors Sturm und Drang dwindled into uninspired sentimentalism, lacking the lofty concepts of Goethe and Schiller. It became fashionable to revel in a twilight mood of misery. Presently the sobering philosophy of Immanuel Kant restored order. Backed by stern Lutheran theology, Kant expressed a concept of duty and a call for reasonable action based on high moral principle (his doctrine of the Categorical Imperative). Goethe swung back to classic order as a result of his studies in Italy. His greatest work, 'Faust', represents a lifetime of thought on the problem of how good can conquer evil. Richter's ironic novels helped literature regain balance.

The Romantic Movement in Germany

Toward the close of the 18th century, the literature of England, France, and Germany entered a period now called the Romantic movement In general, it emphasized the expression of imagination, emotion, pleasure, experience, love of nature, and an interest in the past. It opposed all the restraint and order that classicism stood for.

In Germany, the Romantic movement was spurred by the work of the brothers Jakob and Wilhelm Grimm. They collected a vast number of German folk tales and awoke interest in the rich store of national tradition. The philosopher Fichte spoke for intuition as the underlying basis for reason, and Schelling proposed the imagination as a guide to life The Romantics were individualists, sometimes obscure and capricious. But they broke the restraints that had held poetry in a rigid mold and opened the broad vista of the past and of foreign thought to the provincial German mind.











Water of Wer

The greatest of the German Romantics was Heinrich Heine. As a lyric poet he was surpassed only by Goethe, as a master of wit and irony he held an equally high place. His poems Du bist we cone Blume' (Thou ecemest like a flower) and 'The Loreler' are among the most loved of German verses (see Heine)

Heme hved in the years of Germany's etruggle against the rise of absolute monarrhy The Revolution of 1848 was defeated by Prussian force But political defeat could not crush the rising spirit of freedom Schopenhauer a pessimistic but proviking philosophy appealed with new force and advances in ecience brought a materialistic attitude to ble

In literature men turned from the "moon ht magic nights' of the Romanticists to the clearer light of day Observation and objectivity replaced feeling and subjectivity Two dramatiste Friedrich Hebbel and Otto Ludwig were pathmakers in this more real setic style Richard Wagner sought a closer union between drams and music in his operas Many not elists, such as Alexis and Meyer, followed Walter Scott m writing historical novels. Others wrote of peasant and village life Theodor Storm's village novel 'Immensee' bridged the gap between the waming Romanticism and the new realism

In the last decades of the 19th century, the displacement of human labor by machinery industrialism and life in the big city meant poverty and suffering to many people There was conflict in the thought of the time On the one hand Nietzsche was expressing his doctrine of the value of the individual and the coming of the superman On the other, men were studying social conditions and trying to make life less hard for the lower classes At the same time impulses to a new movement in literature called Naturalism came to Germany from Scandinavia, France, and Russia through Ibsen, Zola and Tolstoy

Naturalism and the New Drama

Naturalism emphasized the minute description of environment and the portrayal of the ugly rather than the beautiful An association die freie Bühne (the free stage), was formed by a group of drams entice to further the performance of the new type of plays Hauptmann's 'Vor Sonnenaufgang' (Before Sunnae) m 1889 marked a new era in German drama He wrote many other naturalistic plays and at a later period the symbolistic play 'The Sunken Bell Sudermann won popular favor at home and sbroad by many novels and dramas. He was a skillful playwright rather than a great dramatist Laliencron an army officer put into poetry the everyday experiences of his nwn life in new and changing meters

Naturalism with its emphasie upon outward conditions and upon the sordid and ugly could not long satisfy the German mind Thus almost concurrently with Naturalism came the movement known as Impressionem It implied an emphasis upon the sch (that is the "1"), the personal the soul, but with keener analysis than in Romanticism The noveliets Gustav Frenssen Clara Vielig and Helene Bohlau described their native towns and districts in a naturalistic way Their impressionistic touches distinguished their stones from the older type of village tale Schnitzler wrote sonhisticated comedies for the stage

The Literature of Social Problems

The so-called new Romantic movement was also apposed to Naturaliem Hugo von Hofmannathal wrote lyneal dramatic pieces full of musical charm. and Ricarda Huch wrote unportant entical works and developed further the historical novel. Classest tend. encies also appeared Rainer Mana Rilke wrote mystical poems that lost little of their beauty in Eng lish translation. The aristocratic Stefan George emphasized form in his lyrics Richard Dehmel sought a harmony of spirit and of form in his lyries. The theme of his poetry was the individual in his relation to society Thomas Mann Heinrich Mann and later Erich Mana Remarque in their novels sought a solution of the same social problems These tendencies to consi ler the good of society as

a whole as against the individualism of Nietzsche's philosophy grew stronger from the period of the 1890's on Philosophers thought of the incividual in his relation to the universal and the absolute. A new attitude to religion grew up, especially after the first World War In the schools the Youth Movement rose This changing attitude in philosophy and rebgroups reflected in literature after about 1910 In literature the movement is called Expressionism. The Expressionists sought a new style and technique in the drama and new forms in lyric poetry. In the field of philosophy, Oswald Spengler attained fame and influence overnight with his 'Decline of the West'. In it he traced the life and death of great civilizations. Many dramas of Ernst Toller were based on the first World War. To the 20th-century poet God and soul were realities, and he expressed these realities in terms not merely of personal experience, but in terms of the typical and the universal. The reflective poet Franz Werfel and the mystical poet Rainer Maria Rilke were outstanding names in the poetry of that period. Fritz von Unruh, in his lyrics and dramas, found the meaning of human existence in love and brotherhood. (For Reference-Outline and Bibliography, see Language and Literature.)

## Chief Figures in German Literature

Ulfilas (311?-383?)—Translation of Bihle into Gothie. Walther von der Vogelweide (1165?-1230?), minnesinger; national poet of Middle Ages.
Wolfram von Eschenhach (1170-1220), poet of knighthood—'Parzifal'; 'Titurel'.
Martin Luther (1483-1546)—Translation of the Bihle; hymns. Hans Sachs (1494-1576), mastersinger and dramatist—'Fastnachtsspiele' (Shrovetide Plays).
Friedrich Gottlieh Klopstock (1724-1803), classical poet—'Der Messias' (The Messiah); odes.
Gotthold Ephraim Lessing (1729-1781), critic and dramatist—'Emilia Galotti'; 'Minna von Barnhelm'; 'Laokoön'.
Christoph Martin Wieland (1733-1813), novelist and poet—'Der goldene Spiegel' (The Golden Mirror); 'Agathon'.
Johann Gottfried von Herder (1744-1803), critic—'Kritische Wälder' (Critical Forests); 'Ideen zur Philosophie der Geschichte' (The Philosophy of History).
Johann Wolfgang Goetho (1749-1832), poet, critie, dramatist, and novelist—'Die Leiden des jungen Werthers' (The Sorrows of Young Werther); 'Wilhelm Meister'; 'Faust'; 'Hermann und Dorothea'.
Johann Christoph Friedrich Schiller (1759-1805), poet and dramatist—'Das Lied von der Clashel (2005).

Johann Christoph Friedrich Schiller (1759-1805), poet and dramatist—'Das Lied von der Glocke' (The Song of the Bell); 'Wallenstein'; 'Maria Stuart'; 'Die Jungfrau von Orleans' (The Maid of Orleans); 'Wilhelm Tell', Johann Paul Friedrich Riehter ('Jean Paul') (1763-1825), humorous novelist—'Quintus Fixlein'; 'Siebenkäs'; 'Flegelighre' (Wild Onte)

humorous novelist— Quintus Fixlein'; Siebenkās'; Flegeljahre' (Wild Oats).
Friedrich de la Motte Fouqué (1777-1843), poet and novelist
— 'Undine'; 'Theodolf, the Icelander'.
Heinrich von Kleist (1777-1811), dramatist and poet—'Penthesilea'; 'Der zerbrochene Krug' (The Broken Pitcher).
Jakob (1785-1863) and Wilhelm (1786-1859) Grimm—
Fairy Tales.
Arthur Schopenhauer (1788-1860), philosopher—'Die Welt
als Wille und Vorstellung' (The World as Will and Idea).
Franz Grillparzer (1791-1872), Austrian dramatist—
'Sappho'; 'Das goldene Vliess' (The Golden Fleece).
Heinrich Heine (1797-1856), poet—'Die Lorelei' and many
other poems; 'Reischilder' (Travel Pictures).
Wilihald Alevis (G. W. H. Haring) (1798-1871), novelist—
'Der falsche Waldemar'; 'Roland von Berlin'.
August Heinrich Hoffmann ("Hoffmann von Fallerslehen")
(1798-1874), poet and song writer—'Deutschland,
Deutschland üher alles'.
Fritz Reuter (1810-1874), novelist—'Ut mine Stromtid'

Deutschland üher alles'.
Fritz Reuter (1810–1874), novelist—'Ut mine Stromtid' (From My Peasant Days).
Berthold Auerhach (1812–1882), novelist—'Schwarzwälder Dorfgeschichten' (Black Forest Village Stories).
Friedrich Hehhel (1813–1863), poet and dramatist—'Judith'; 'Herodes und Marianne'; 'Agnes Bernauer'.
Otto Ludwig (1813–1865), dramatist and novelist—'Der Erhforster' (The Hereditary Forester); 'Zwischen Himmel und Erde' (Between Heaven and Earth).
Richard Wagner (1813–1883), writer of operas—'Lohengrin'; 'Tannhäuser'; 'Der Ring des Nibelungen'; 'Tristan und Isolde'; 'Die Meistersinger'; 'Parsifal'.
Gustav Freytag (1816–1895), novelist and dramatist—'Die Journalisten' (The Journalists); 'Soll und Haben' (Dehit and Credit). and Credit).

Theodor Storm (1817-1888), poet, novelist, and short story

'Theodor Storm (1817-1888), poet, novelist, and short story writer—'Immensee'.

Gottfried Keller (1819-1890), poet, novelist, and short story writer—'Der grüne Heinrich' (Green Henry); 'Die Leute von Seldwyla '(Seldwyla Folk).

Theodor Fontane (1819-1898), poet and novelist—lyric poems and ballads; 'Effi Briest'.

Conrad Ferdinand Meyer (1825-1898), Swiss poet and novelist—'Jürg Jenatsch'; 'Der Heilige' (The Saint).

Paul Heyse (1830-1914), poet, dramatist, novelist, and short story writer—'L'Arrabbiata'; 'Kinder der Welt' (Children of the World); 'Im Paradiese' (In Paradise). Wilhelm Ranbe (1831-1910), novelist—'Cristoph Pechlin'; 'Horacker

'Horacker'.
Friedrich Nietzscho (1844–1900), philosopher and essayist'Jenseits von Gut und Böso' (Beyond Good and Evil);
'Also sprach Zarathustra' (So Spake Zarathustra).
Detlev von Lilieneron (1844–1909), poet.—lyric poems.
Ernst von Wildenbruch (1845–1909), poet, dramatist, short
story writer—'Die Karolinger' (The Carolingians); 'Quitzows'; lyrics, ballads, short stories.
Karl Spitteler (1845–1924), Swiss epie poet and novelist'Der olympischo Frühling' (The Spring of Olympus).
Hermann Sudermann (1857–1928), dramatist and novelist'Es lebe das Leben' (The Joy of Living); 'Heimat' (translated as Magda); 'Frau Sorge' (Dame Care); 'Die Ehre'
(Honor).

(Honor). Clara Viebig (1860- ), novelist—'Das tägliche Brod' (Daily Bread); 'Das schlafende Heer' (The Sleeping

Àrmy) Gerhart Hauptmann (1862-1946), dramatist—'Die Weber' (The Weavers); 'Die versunkene Gloeke' (The Sunken Bell); 'Hannele'.

Arthur Sehnitzler (1862-1931), Austrian dramatist and novelist—'Anatol'; 'None hut the Brave'; 'The Lonely Wey'.

Gustav Frenssen (1863-1945), novelist—'Jörn Uhl'. Richard Dehmel (1863-1920), poet and dramatist—'Michel

Michael'; lyrie poems.
Frank Wedekind (1864-1918), dramatist—'Fruhlings Erwachen' (The Awakening of Spring).
Ricarda Huen (1864-1947), novelist and poet—'Defeat';

'Victory'; 'The Deruga Trial'.
Stefan George (1868-1933), poet--'Das Jahr der Seele' (The Year of the Soul); 'Die Lieder von Traum und Tod' (Songs

Year of the Soul); 'Die Lieder von Traum und 16d (Souss of Dreams and Death).

Heinrich Mann (1871-1950), Novelist—'Die Armen' (The Poor); 'Mutter Marie' (Mother Mary).

Jakob Wassermann (1873-1934), novelist—'The World's Illusion'; 'Caspar Hauser'; 'The Maurizius Case'.

Hugo von Hofmannsthal (1874-1929), Austrian dramatist—'Elektra'.

Thomas Mann (1875- ), novelist—'Die Buddenbrooks';
'Der Zauherherg' (The Magic Mountain); 'Der Tod ia
Venedig' (Death in Venice).

Hainer Maria Rilke (1875–1926), poet—lyric poems.
Hermann Hesse (1877– ), novelist and poet—'Peter Camenzind'; 'Sıddhartha'; 'Narziss und Goldmund' (Death and the Lover); 'Das Glasperlenspiel' (Magister Ludi).
Oswald Spengler (1880–1936), philosopher—'Der Untergang des Abendlandes' (The Decline of the West).
Fritz von Unruh (1885– ); dramatist, poet, and novelist—'Ein Geschlecht' (Of One Race); 'Heinrich aus Andernach'; 'Opfergang' (The Way of Sacrifice).
Arnold Zweig (1887– ). novelist—'The Case of Sergeant Grischa'. Ramer Maria Rilke (1875-1926), poet-lyric poems

Griseha

Paul Kornfeld (1889-1942), dramatist—'The Seduction'. Walter Hasenelever (1890-1940), dramatist—'Beyond'; 'The

Walter Hasenelever (1890-1940), dramaust—Beyond, Son'.

Son'.

Son'.

Franz Werfel (1890-1945), Austrian novelist, poet and dramatist—'Ennander' (One Another); 'Der Spiegelmensch' (Reflected Humanity); 'Class' Reunion'; 'The Pure in Heart'; 'The Forty Days of Musa Dagh'.

Ernst Toller (1893-1939), poet. dramatist—'Massermensch' (Man and the Masses); 'Die Machinenstürmer' (The Machine Wreckers); 'Die Wandlung' (Transition)

Erich Maria Remarque (1898— ), novelist—'All Quiet on the Western Front'; 'The Road Back'.

# The GERMAN PEOPLE and Their LAND



o German peop e have a deep love for the mx on c Rhane R ver ha poetry and song lake. The Wetch on the Rhane t sym lives their patr clism their strength, and their history. Here terraced vineyards rue to a cast a rue dung the steen bank.

ERMANY The homeland of the German people is in the heart of Europe It s a rugged land of w de pla ne and forested h ghlands that reach up nto the Alps in the south. For centures t was split into k ngdoms states duchies and free cit es Then n 1871-nearly 100 years after the b rth of the United States-these many un ts 10 ned together to form the German Emp re

The Germans were devoted to the r homeland. They called it Das Vaterland the Fatherland and Deut-Pat ent bard work ng sches Resch German realm and thorough they developed t ato the strongest nat on on the continent of Europe

But twice in the 20th century w thin a single gener at on Germany m sused its po er to launch a world war Both t mes it suf

fered defeat Today as a result of the second World War it is splt into two separate countr es The larger s the Feder-

al Republic of Germany o West Germany It is a democracy sponsored by the free nat ons. The area of West Germany is 95 867 square m les vith a popu lat on of 49 728 763 It 19 largely industrial

The second nat on is the German Democrat c Republic or East Germany

r sn North to sou b shout 500 on en cent to wer 250 to 300 m; en Weat terrosay a sa, \$5.507 square index popula, on 1930 caprus 49 732 274 Eas. Or many area 4 535 square miles population (1940 centura 25 27 357

It is a Commun state controlled by Russia The area of East Germany sonly 41 535 square miles Ita popu lat on a only 18 488 318 It a cheffy agr cultural

Though Germany s now spl t polit cally the land must be seen as a whole to un lesstand how the people bult Germany into a mighty country and to under stand the r problems today

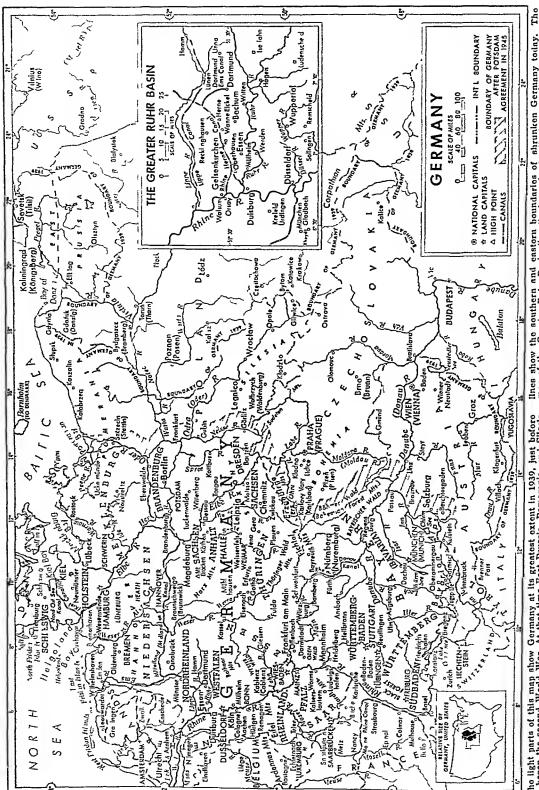
Location and Size of the Land

Germany is a Central European land. It has in about the same lat tude as Ontar o Except where it opens north to the Balt c Sea and the North Sea at is land ocked. It has more ne ghbors than any other European land and almost no natural front ers

Just before the outbreak of the second World War Germany covered 181 630 square m les Greater Ger which neluded many the se zed terr tor es of Austra and the Sudeten

land stretched over 225 199 square m les

The var stripped Ger many of its conquests and some of ts own terr torychiefly 8 les a and East Pruss a Today al runken Germany extends about 500 m les from north to south and 250 to 500 m les from east to west. Its total area s only 137 409 square m les-the com b ned areas of West



map of the Greater Rulir Dasin (inset) shows in dotall the crowded crites, rivers, and canals that make this part of the lower Rhine River the industrial heart of Germany. Tho light parts of this map show Germany at its greatest extent in 1939, just before it began the second World War. At that time East Prussin, Pomerania, and Silesia were part of it, and it had annexed Austria and dominated Czechoslovakia The shaded

Germany and East Germany This area makes Ger many the fourth largest country of Europe but smaller than the single American state of Montana

#### Nature of the Land

Two natural regions divide Germany almost in half Northern Germany 19 part of the Great European plain and is mostly flat and low Southern Germany is a rugged mass of highlands, which rise into plateaux and mountains and dip in rich valleys The southern edge of the plain winds from Aachen on the Belgian border eastward through Dusseldorf Hanover and Leipz g, to Gorlitz on the Neisse River From that anproximate line the pla a gradually drops to the Balt c and North seas. The coast had as so regular that at provides few good harbors except where rivers have carved navigable channels for large ships

Four great rivers flow northwest across the plans I nking the southern highlands with the seas The Oder River in the east empties into the Baltic The Elbe and the Water flow into the North Sea (see Elbe River) The mouth of the mighty Rhine in the west is outside Germany in the Netherlands (see Rhine River) These rivers carry barges and small eteam ers far into the heart of Germany Through the rugged highlands of southern Germany the upper Danube flows eastward leading into Austria and the countries of southeastern Europe (see Dan the River)

The plain is the work of the Ice Age (see Ice Age) The giant ponderously moving ice sheets scoured north Germany into flat land except for moraines along their edges-r dges of boulders gravel and sand In the plans northeast one ndge forms the Baltic Lakes Plateau or Baltic Heights Dotted by lakes it rises from about 300 feet to 1 000 feet. On the flat coast below it a fert le str p of lowland reaches mland from 10 to 20 miles To the southwest between the Elbe and the Weser another ridge forms the Luneburg Heath

Luneburger Heido Land Bays and Valleys The plan reaches south

ward into the highlan is forming three great land bays among the rugged heights These bays are the basins of the Oder the Elbe and the Rhine

As the ice melted along the edges of the plain the floo! waters cut some valleys in an east-west direct on The Ger mans used them as routes for canals and railways to link with the northward flowing rivers Between the valleys he sandy stretches

Highlands Mountains The last glaciers of the Ice Age dd not reach into central Germany Beautaful hills and knots of forested

ZONES IN GERMANY AND AUSTRIA After the second We ld Wer Germany and A occup ed zones by the Un ted Sieles eccup as zones by the united blass Squain France and Kuissa. They jointly administered Be lin (inset) Poland to next of East Germany and divided East Prussia with Russi

mountains jut above high plateaus out by deen river valleys Tile mountains are low with rounded sum mits The Hars Mountains rise abruptly from the plan But their peak the Brocken of folklore rises to only 3 747 feet (see Harz Mounta ns) To the south east stand the Eregeb rge or Ore Mountains named for their wealth of ore Ers and Gebirge mountains Other central Germany ranges nelude the Fichtel Thursager Wald Bohtner Wald and the Rothagr Southern German mountains are higher. The Black Forest mounta as or Schwarzwold help to shelter the nnner Rhine Valley (see Black Forest) Lake several Ger man ranges it is so leavily wooded it is called a forest Wald instead of 'mountains

The great Alas reach into southernmost Germany in Bayana (see Alps) There about 50 miles southwest of Munich rises the Zugspitze

This peak towers 9719 feet and is the highest point in Germany

Lakes of Germany

Germany s largest lake is beautiful Lake Constance or Bodensee on the Swiss-Austnan border It is about 40 m les long Only the north and west shores are German

The hills and mountains of southern Germany cup many pacturesque lakes such as Chiem See in the Bayaman Alps Central Germany has few lakes But hundreds of small shallow lakes linked by rambling rivers form a network in the Baltic region of the northern German plain

Climate Nearly Uniform The German people enjoy a temperate chmate, with mild

POLITICAL DIVISIONS OF GERMANY West Germany (Federal Germen Republic) 25 4 vided into 10 states or Lander

Bayarta (Bayera) Berl n West Bremen Hemburg

Lower Surony (Nucleouscheen

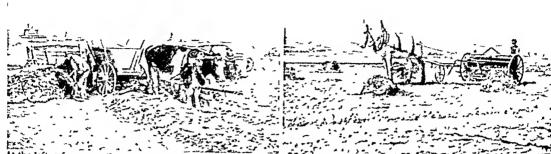
NorthRham Westphal n(Northhean-Westfalen) Rh neland Palstanate (Rhemland-Pfols) S blesway Hofstenn Warttemberg-Badea East Germany (German Damotratic Republic)

in 1952d vided 5 states Brandenburg Mecklen burg Sexony Sarony Anhalt and Thursday mto 14 districts East Berlin was not changed Frankfurt Cotthus Potsdam (from Branden

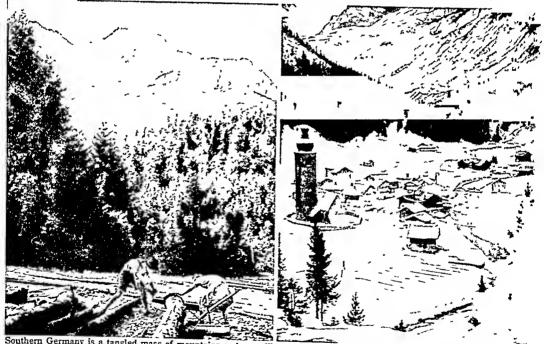
burg) Bardack Schwer n Neubrandenburg (from

Me Menburgi Le prig D enden Chemn iz (from Saxony) Madgeburg Halle (from Same y-Anhalt) Erfort Gera Suhl (from Thurng a)

# FROM NORTH TO SOUTH IN GERMANY



At the left, a farmer on the great northern plain of Germany loads turnips into his oxcart. About half of Germany lies on the plain. At the right rise the gentle hills of central Germany. This farmer works his small fields near Frankfort-on-the-Main. Some German farmers use agricultural machines, but most farms are so small that horse and oxen are usually employed.



Southern Germany is a tangled mass of mountains and gorgelike valleys. At the left, husband and wife cut logs in the Bavarian Alps. They will float them to a sawmill. Small-scale logging like this is one of the chief industries of upland Germans. The beauty of Bavaria, as shown by the snow-covered village at the right, makes it a resort center in both winter and summer.

winters and summers. It varies little from north to south, because flat northern Germany is open to the tempering sea winds, while the altitude of the highlands keeps southern Germany cool. The warmest part of southern Germany is the sheltered valley of the Rhine and of its tributaries—the Moselle, Neckar, and Main rivers. The coldest is mountainous Bavaria.

A wider difference in climate occurs from west to east. The prevailing westerlies give western Germany almost a marine climate. Eastward the climate becomes more continental, with a wider range between summer and winter temperatures.

Rainfall is usually enough for all types of agriculture. The heaviest fall is in summer, with the peak usually in July. Most parts of the land get from 20 to 30 inches a year.

In the north the greatest fall is in the Harz Mountains, the first range standing in the path of the

### FARMING PEOPLE AND THE LAND'S VARIED CROPS



This Bavarian family is saving grace before suppor The men a boys have spent the day pastu ing their cows in A pare meado Dairying is, an improved industry in acutiary fixed in

Vineyards mouran on supply stopes in the Kaute Valle These time are guitering grapes for the winer as The grapes wi be crushed fermen ed and aged to produce white table wine



On the northern plain women work with men to gather potator that have been scooped out of the ground by a harvester Potatoes form a large part of the German people a diet.

moist sea winds from the northwe.t From 30 to 40 inches drench the Harz In southern Germany cragsy Bayrana gets up to 55 mehes of preup dat on while the sunny Rhine Valley gets only from 16 to 20 mehes

The People Their Language and Customs Germans come of mixed stock Northern Germans are usually tall fair haired and blue-eyed They resemble the yellow haired Teutonie warnors described by Caesar, South and central Germans tend

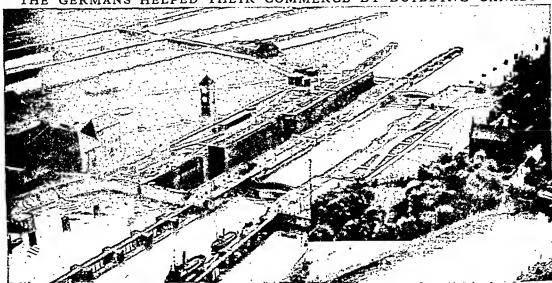


here young Bavariahs are cutting hay on a moun aid slope will are awags of their acythes. They will load the hay into basket: nd carry it down into the valley to feed their stock.

to be shorter heavier and darker. From their earliest days the Germans have seemed to depend heavily on firm leadership. But individually they are hard working thrifty methodical and painstaking.

German schools teach High German the speech that comes from the highlands of southern and central Ger many These were the German regions first touched by cylizat on and Christanity as they were colonized by the Romans They long led the rest of Germany in

## THE GERMANS HELPED THEIR COMMERCE BY BUILDING CANALS



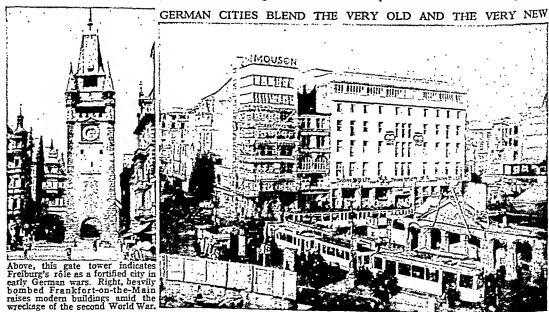
This is the famed Kiel Canal, one of many in Germany. Opened in 1895, it crosses the peninsula of Schleswig-Holstein. It saves a voyage of about 250 miles around Denmark, and so helped Hamburg to rival Copenhagen as a gate to the Baltic Ses.

education and the arts. In north Germany many speak Low German, which is accented differently and is more guttural. Both languages have several dialects.

Customs vary in different regions, but Germans are noted for their love of music, dancing, and the out-of-doors. Mountain villages preserve many of the old ways of dress and life. But over half the people live in cities or towns. It has been said that "city Germans take their recreation seriously," because they seem to plan their outings meticulously. They especially like to cycle, hike, camp, and boat—threading

the many rivers in collapsible canvas canoes, or Fallbolen. Camp sites and inexpensive hostels dot the land. Germans Improve Their Agriculture

Though less than half the Germans farm, agriculture is the chief industry. Western Germany farms are small, from about 50 to 100 acres. The large Prussian estates in eastern Germany have been split among the former workers. Except for the land bays, most of the northern plain is naturally rather poor. But late in the 19th century German scientists developed fertilizers from the potash of Silesia and began an



# GERMANY S MANUFACTURES RANGE FROM MACHINERY TO TOYS



intensive system of eron rotation to feed and rest the soil The plain is now the chief source of rye and potatoes the principal foods of the Germans Quantities of sugar beets and some wheat grow in the southern part of the plain The Rhineland vineyards produce world famous dry wines and Bayaria grows hops for beer the nat onal drink. The German el mate is so cool farmers can grow very little corn

Nearly every region grows hay Stock raising and dairying are on the increase Almost every farm va ses hoge and sausage and other pork products are noted German dishes Truck gardens in the industrial areas help to supply city workers with vegetables Fah er es add to the food supply with large catches of berring mackerel codfish haddock and other fish

But from the time Germany began to industrialize in the 1870 s it has not been able to produce enough to feed itself. So many workers are in industry that Germany must import agricultural products and pay for them with manufactured goods

Scientific Forestry Conserves Timber

In barbarian times Germany was largely covered by forest Today forests cover about a quarter of the land During the empire government control enabled Germans to pioneer in sc ent he forestry No one was allowed to cut a tree even in a private forest with out planting another Thinning the trees and remov ing underbru h let the timber grow tall and mastike for lumber and pulp During the second World War German scientists made ereats or subst tute products

from wood pulp Because evergreens grow relatively fast they are largely now planted for forest but cates continue to grow the favorite indens Manufacturing Aided by Minerals

Germany was late to feel the Industrial Revolution (see Industrial Revolution) But when its people did turn to manufacturing in the 1870 s their traits and natural resources soon moved them into the industrial leadersh p of the continent Lake other industrial countries Germany based its

manufactures on a good supply of coal The Ruhr basin gave it Europe's largest bedy of coking coal More lay in Silena and the Germans won still more in the Saar basin of Alsace-Lorraine There they had pron-ore deposits and some petroleum (see Alsace-Lorraine) They also had vast beds of lignite This brown coal was too poor for coking but it fueled electric power and aided dye making and the chemical manufactures based on potash from Siles a Until just after the first World War Germany had a world monopoly on the manufacture of aniline dyes (see Dyes! The country was also nich in vast deposits

of salt The Ruhr basin became an almost cont nuous string of great industrial cities Like the American cities of Gary Ind and Pittsburgh Pa they turned out iron and sizel products At Essen the grant Krupp works sprang up (see Essen) Other raties made textiles chemicals electrical goods leather products toys and pottery In east central Germany Leipzig spe-

## GERMANS DELIGHT IN THEIR OUTDOOR CAFÉS



Even though it is cool enough for topcoats, these Berliners sit at sidewalk tables to enjoy coffee and conversation. Every large German city has a number of coffee-houses as well as outdoor beer gardens.

cialized in printing, and Jena in optical goods, microscopes, and camera lenses (see Leipzig).

Munieh and Dresden became world-known as centers of culture, education, and technology, but they also added to Germany's manufactures. Nuremberg's eraftsmen gained fame as toymakers. Both Aachen and Cologne grew to be grant rail centers and produced heavy industrial goods. The vast city of Berlin housed almost every sort of manufacture. (See also Aachen; Berlin; Cologne; Dresden; Munich; Nuremberg.)

Cheap water transportation also aided German industry. A low-level network of canals links the principal navigable rivers. The Mittelland Kanal (Midland Canal) joins the Ems, Weser, Elbe, and Oder rivers. In the north the Kiel Canal euts across Schleswig-Holstein. Heavy freight in the Ruhr is shipped through the Lippe and Rhine-Herne canals. Canalizing the Main River made the Rhine-Danube Canal possible.

## Builds Great Foreign Trade

Germany not only became the manufacturing center of the continent, but it also built a huge foreign commerce. This was partly the reward of the methodical approach of the Germans. They studied the tastes as well as the needs of foreign customers, then produced articles to suit. German commercial agents learned the languages of their customers. At the outbreak of the first World War the volume of German commerce was second only to that of the United States. Much

of the commerce that was lost during the war was recovered soon after, especially in South America

Shipping became one of Germany's ehief industries Hamburg on the Elbe River, 75 miles inland from the North Sea, grew to be Europe's largest scaport. Its shippards turned out all types of vessels for ocean and river trade (see Hamburg). Lubeck, Rostock, and other Baltic scaports, famed in the days of the Hanseatic League, lost most of their old importance when vessels became too large for their shallow harbors.

AFTER SCHOOLROOM LESSONS—AN OUTING

At left is a classroom in one of the new schools built in West Germany since the end of the second World War. Boys and griss informally at their work tables. On the blackboard is a drawing of "Our Heart" (Unser Herz) American educators supervised the postwar textbooks. At right, a young hiker, rucksack on back, is greeted by the director of a youth hostel.

Most of these ctes were such keps to German might that they were severely bumbed in the second World War Aachen Cooper Hamburg and Berin wer vursully mared it has been estimated that rebuild eige these ctes to their full extext will repuise from 25 to 40 years. Contractors are trying to speed the work by processing the mibble into build ng stone. People in all the bombed ctes are making efforts to restore their family gradiens where they enjoy the rest and beauty of the outdoors after work. The victorious po ers are returning art treasures to German museums.

#### Education under Empire and Histor

During the empire and Htter Thand Rench German enclosi emphasized rubbless had cond an and technology. Germany von rencon during the empire for the thorough ness of 1st univers by training in research and experimentation. Students came from abroad to be branced in searce. Varing also publications are searce to the state of the state of the thing of the German version of culture. Auditor which stressed distinct thought it also incultivated the sizes that Germans formed a super race. At the University of Headsherg, salest duel scans.

were honced as the mark of a genileman Both the sump rea and Hier & Thurk Rechturned education to sene the nationability drive of the state Teachers arressed the dest my of the Germanneer much as teach even in Japan propagandized their pupils. Even sports were organ and into demonstrations of mational price for grey manners at the Olympie

Games in Berlin in 1936 were received with coolness Under the emp re Germany wisely prov ded elementary education for all boys and girls But it fa

vered these of noble b rh or wealth. These went on to classe all or nuce course seahools then univers test The boy served but once year in compulsery mil tary training. They got the better pols as officials as on the served of poorer means went on to trade or voca total schools or in some restances test in calculage. The Nam Thard Re ch followed this plan to a large extent send very bol stered it with nationalistic youth organications.

#### Education Becomes a Problem

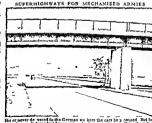
After the Re ch's defect in the second World War the vectorious western Alles set out to de-Naz fy German teachers and Ingostat, textbooks They found the task difficult. The problem was doubly hard in West Germany s 16 universities for the college students had sport all their earlier school days under the Nizai system of reprinentation. And while the democrace is

A FAMOUS CASTLE IN THE BAVARIAN ALPS



Symbolic of the days when a multi-unde of more or less independent grant or of Germany is that east ed it fiving hymnitem. But it is 1809 by Ludway of Bavaria it follows in its general des yn the type of cest a common in a meantain start its of Germany in the M de A res

worked to have the West German schools try to teach the principles of democrate self government. East German schools artessed Communism. (For government, see the following history section.)



Hat or never de vered to the German we kers the cars he p omised. But I kept thousands busy building a network of superhighways. Over them machenized armsits, rolled out of Germany to try to conquer a continue.

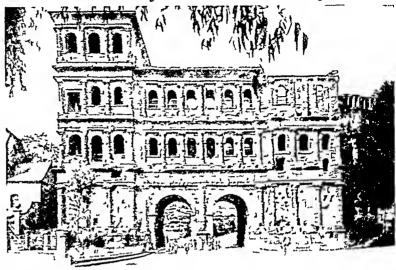
# Two Thousand Years of German History

AS LONG as 2,000 years ago Germans were hving in the lands west of the Rhine River Their ancestors may have migrated there from the grasslands of southern Rus-They pushed back the stalwart Celts The Germans, when the Romansfirst battled them in 113 BC, were warlike barbarians The mcn hunted while the women worked the fields, yet the men respected the women The German barbarians fought the northward march of the Roman Empire. But the empire built colonies, such as Trier and Cologne, up to the middle Rhine, then penned the Germans behind fortifications called Limes Germanicus

Meanwhile the Germans organized into barbarian groups, such as the Franks, Goths, Salons, and Vandals. In the 3d and 4th centuries of the Christian Era they wrested lands from the weakened Roman Empire (see Middle Ages). But in the 8th and 9th centuries most of these barbarian conquests were absorbed into the kingdom of the Franks, which reached its height under Charlemagne

(see Charlemagne). The south Germans had already been converted to Christianity by Irish monks and by St Boniface (see Boniface, Clovis). Charlemagne forced the north Germans to become Christians. His realm extended north to the Baltic, south to Spain and Italy, but only to the Elbe in the east where the Slavs lived The split of the Franks' empire in the Partition of Verdun in 843 marked the beginning of Germany and France as separate states Between them lay a strip-Lorraine-which both sought for 1,000 years

Medieval German States
For several hundred years
after 843 Germany was cut
into "stem duchies." Each
was the home of a separate
stem or branch of the German
people. The chief duchies
were Bavaria, Swabia, Franconia, and Sayony. The Franconian dukes were the first to



Centuries of war have spared this Roman gate at Trier. It is a relic of Roman colonies in Germany. The Romans brought civilization into central Germany.

become German kings after the end of Charlemagne's line in 911. Then Savon dukes became kings The strongest was Otto I, the Great, who reigned 936-973 He revived Charlemagne's realm, except for France. But the new empire drained Germany's power for centuries as successive emperors sought to enforce their claims, especially over Italian cities, and quar-

reled with the popes (see Holy Roman Empire).

In 1024 the Franconian (or Salian) house was elected to rule. The empire became torn by the Investiture Conflict between Henry IV and Pope Gregory VII and their successors (see Gregory, Popes, Henry, Kings of France) From 1138 to 1254 the Hohenstaufens ruled. The chief rulers of this line were Frederick I, called Barbarossa or "Red Beard," and Frederick II.

But the dram of wars and the spread of feudalism weakened the sprawling empire. The land-division system of feudalism split the stem duchies into a thousand little powers (see Feudalism). Even cities assumed local power. Some, like Hamburg, became "free cities" Many formed themselves into powerful commercial groups, such as the Hanseatic League



(see Hanseatic League) With the breakdown of the emperor a power Germans developed intense loyalty to their towns and local regions

The decline of the emp re resulted in the Great Interregnum 1254 1273 when the electors could not agree on an emperor Germany was in chaos Robber barons arose everywhere and ruled from their billton castles and river forts by Faustrecht ( fist law ) Then Pope Gregory X forced the electors to name Ru dolph of Hapshurg emperor see Hapshurg In 1356 Charles IV assued the Golden Bull fixing the right to elect the emperor in the Seven Electors -the arch bishops of Mainz Cologne and Ther (Treves) the margrave of Brandenburg the elector of Savony the count palatine of the Rh ne and the king of

Bohemia He also confirmed the power of free cities

Religious Strife and Civil War

In the 16th century the emperor could not quell the Reformation the religious revolt started by Luther and aided by etate rulers (see Reformation) The religious struggles of the Thirty Years War 1618-48 further weakened the emperor's power (see Thirty Years. War) The heads of the eeveral hundred etatee became absolute rulers and the Hapsburg emperor only a symbol

Rise of Prussia In the latter part

of the 18th century Frederick the Great of the Hohenzollern I me took lands from Austria and Poland to enlarge his k ngdom of Prussia He made Pruss a the best-ordered and strongest state in Germany (see Frederick the Great Prusua) He prepared the way for a united Germany At the same time an intellectual surge arose in Germany bring ng the great literary and ph.losoph cal vorks of such gifted men as Goethe Schiller Kant

and Hegel (see German Language and Latersture) But the Napoleome Wars devastated Germany The crushing defeat of the Pruss ans at Jena in 1806 led to the reorganization of Prussia. Serfs were freed and Prussia started un versal mulitary service

By 1814 the several hundred German states had been reduced to 39 including Austria The Congress of Vienna 1814-15 grouped these into a loose German Confederat on Its head was a diet or assembly made up of delegates appointed by the German rulers. Austria and Pruss a vied to control it In 1848 German liberals demanded in van that Germany be unshed and given a democratic government

Bismarck Creates New German Empire The actual creat on of a new German Empire was the work of Bismarck (see Bismarck) For years he was the Pressum delegate to the det His experiences convinced him that German unity could be ach eve i only through blood and iron by Pruss a defeating Austria on the field of battle

In 1866 he maneuvered Austria into war and crushed it at Sadona (Koniegratz) Prossia then reorganized Germany and excluded Austria Ruthlessly Prussia annexed the states of Hanover Hesse-Cassel Nassau and the free city of Frankfort-on the Main The other German states north of the Main R ver in ted with Pruss a

in a North German Confederation In 1870 Bismarck tri ked France into de-

claring war (see Tran co-Pruss an War) Defeated France had to cede Alaz e Lorrame to Germany The south German states enthu s ast cally 10 ned tie Pruserin organization

The German Em pre was procla med on Jan 18 1871 in the French royal pai ace at Versa lles The Ling of Prus a was proclaimed perpet nal German emperor or kauser There was a popularly elected leg islature or Reichstag but the real po er lay with the kaiser

Bismarck nos iron chancellor in the teigns of Emperor William I and Emperor Frederick III (see William German Emper ers! Besmarck led the emp re to industrial poner and military might The foundations were laid for a co longs realm which grew to include about 1 000 000 somere miles in Africa (Togoland Cameroons German Southwest Africa German East Africa) and 100 000 square in les in China and the Pacific (K aochow Bay

Germans Bid for World Power Will am II succeeded Frederick III in 1888 (see W 1 lisse German Emperors) In 1890 he rudely di missed Bremarck as chancellor saving Only one is master in the Reich and it is myself. He built Germany into a to litary nation and encouraged Germans to dream of a Pan German state in Europe of Drang nach Osten drive to the east and even of world domination. Alarmed Great Britain France and Russia joined in

in Shantung province Kaiser Wilhelm Land in New

Gumes Bismarck Archipelago Carol ne Islands)



WHEN VICTORY SEEMED SURE



Kaiser Wilhelm, "Most High War Lord," arrives in occupied Wil-no in January 1918, after the collapse of Russia in the first World War. Barely nine months later he fled from defeated Germany.

a defensive paet called the Triple Entente in 1907. But Germany continued to prepare for war.

In 1914 Germany struck. It backed Austria against Russia and so launched the first World War (see World War, First). Defeat in 1918 stunned the Germans, for their homeland had suffered no damage. At the end

of the war, the government collapsed. William II fled, and the rulers of all German states abdicated.

The Hapless Weimar Republic

The bewildered people elected a national assembly, dominated by Socialists. At Weimar it drew up a liberal constitution. But the people were not trained in democracy. They were used to leadership.

Revolts, some led by Communists, flared in large cities. Germans thought only military force could restore order. Demobilized young officers organized veterans into private armies and offered "protection" to wealthy landowners and industrialists. The weak government tacitly approved these lawless bands.

Unemployment and hunger mounted. The Treaty of Versailles had stripped Germany of some of its richest industrial areas (see World War, First, section "The Peace and Its Results"). Inflation soared until it took a billion marks to equal one prewar mark. The middle class was pauperized. The people needed a statesman to guide them, but tradition turned them to an old Prussian leader, Field Marshal von Hindenburg (see Hindenburg). In 1925 they elected him to succeed Friedrich Ebert as president of the republic.

Germany Prospers, Then Collapses

In 1924 the United States aided Germany with the Dawes plan for payment of reparations and followed this in 1929 with the even more generous Young plan. Americans quickly invested luge sums in Germany and the nation prospered. The merchant fleet which had been lost to the Allies was replaced with new, faster ships. Luxury ocean liners and Zeppelins brought in tourists. Copying American methods, Germany modernized its factories. Soon it regained its top place in ehemical, optical, and electrical industries. In 1930 Germany again had sovereignty over its whole land when France withdrew its troops from the Rhine.

But this prosperity was not sound. Even the interest on Germany's huge loans was paid in foreign credit. When the New York stock market erashed in 1929 loans stopped. The Hoover moratorium in 1931 saved Germany from bankruptey, but the weak Weimar government was shaken. In 1932 a strong fascist party opposed Hindenburg. This was the National German Social Workers' party (Nationalsozialistische Deutsch Arbeitterpartei, shortened to Nazi). Its leader was Adolf Hitler, war veteran and demagogue (see Hitler).

Hitler Strides to Power

In January 1933 the military elique (Junkers) persuaded the aging Hindenburg to appoint Hitler chaneellor. This pleased the Germans, for Hitler had promised to make them rich and dominant again. In thundering oratory, he flattered them into believing they were a superior "master race." He hammered into them that their army "had not been defeated," that the war had been lost through trickery of Communists

and Jews. He revived the old German ambitions.

As chancellor, Hitler seized control of press and radio and called an election. A fire flared in the Reichstag. Many believed the Nazis set it. But Hitler declared it was a Communist plot, the start of the Red Terror from which only he could save Germany. The Nazis won the election, and the Reichstag empowered Hitler to govern by decree.

When Hindenburg died in 1934 Hitler took over the power of president as well as chancellor. He became undisputed dictator of Germany (see Dictatorship).

Brutal Régime

Hitler began a reign of terror for all who opposed





Friedrich Ebert, a Social Democrat, was elected in 1919. He strove to give Germany a democratic government. His effort was futile.

his fanaticism. The Nazis se zed the property of Jens and sent thousands to concentration cames where they izens including eminent scholars fled the country

On June 30 1934 H tler ordered

including many of his early supporters were massacred

To bind the masses to the Naza program Hitler set up a propagan da mmistry under fanat cal Paul Goebbels It controlled even art and the theater and tried to affu ence the churches. It tought chill dren to report their parents of

s spected d doyalty to Hitler Organized training of youth be gan at the age of ten At 14 hoven tered the Hitler Youth and zurla iomed the League of German Girls After the youth groups boys and girls went to lahor camps Then the boys went into the army

The Naza set up cells or small groups of party members in every office factory and rural district

to see that the people upheld Hitles An aide Hein tch Himmler organized secret police the lreaded Gestapo Robert Ley led the chauven at c Strength through Joy organization which provided low cost recreation for German workers Unscrupulous Her mann Goering dictated national economy Defying the Versa lles Treaty Hitler rearmed Germany By 1936 factories throbbed with war industries and Germany

were tortured. Storm troopers seved the funds of trades unions and Communists Thousands of German esta blood purge of even the \ars In one day over a thousand people



Secretly H tler made a nonaggression nact with Russia des gned to prevent a second front in the event of war with Britam and France Then on Sept 1 1939 his troops invaded Poland start ug the second World War (see

Marid

Rome-Berlin Axis Later he brought Japan Hun

gary and Son n into an anti Committeen pact which

By 1935 be commanded the most powerful mechan

and France woefully unprepared were forced to a policy of appease

ment They offered no opposit on

when H tler seized Austria in March

1938 In September in the hope of averting war they signed the Mu

nich Pact grang the Sudeten lands

of Czecho lovakia to Germany In

March 1939 Hitter seized nearly atl

Crechoslovakia and took the former

thing he vanted without war. The Name same Today we own Ger

many tomorroy the whole wide

Poland give him Danzig and other

territory Poland refused Britain

and France had pledged and to Poland an i warned H tler

Launches Second World War

H tler demanded that

German d strict of Memel Hitler seemed able to get any

used army and largest air force in the gorld England

was designed to prevent the spread of Communism

World War Second) After crushing the Poles in a bit krieg ( lightning war ) he subdued Norway Denmark Belmum and the Netherlands France fell in June 1940 The Naz s soon got control of southeast Europe and used Italy

vas stocking up aga nat a poss ble blockade Hitler forbade farmers to leave the land workers to change toles. He set or ces and wages banned umons and strikes and ordered what manufacturers must produce

Expand1 Most Germans accepted this virtual seridom in return for Hitler's pledge to restore Ger many s prewar prest ge and military power When the Albey banned rearmament Hitler led Germany out of the League of Nations in 1933 In 1936 his troops occupied the demilitar ized zone of the Rhine land He then formed an

alliance with Italy the



favored a decentralized federal republic. France wanted a loose federation of German states. Russia demanded a highly centralized government.

Fixing Germany's boundaries was another grave problem. Poland regarded its acquisitions as final, despite an American announcement that revision would be considered. Belgium, Luxemburg, the Netherlands, and Czechoslovakia demanded buffer zones. France elaimed a customs union with the Saar. It also wanted to internationalize the Ruhr and to occupy the Rhineone national government. To speed recovery in their zones, the Anglo-American and French authorities permitted West Germany to become a republic.

This Federal Republic of Germany began on May 20, 1949. Its constitution provides for a federal diet. Bundestag, cleeted by universal vote, and a federal council. Bundesrat, composed of members in the government of the Lander, or states. The diet passes the laws, but the council has a limited veto. Members of the federal government elect the president of the

republic for five years. Bonn is the capital.

Russia made a quick counter move. Oa May 30 Communist Germans ratified a constitution, which changed East Germany into the German Democratic Republic, effective October 7, despite a large noa-Communist vote against it. East Berlin became capital of the puppet "republic." Thereafter, elections in East Germany were rigged as in other dominated nations behind the "iron curtain."

East Germany created an armed "police force" and

a secret police like the old, terrifying Gestapo. Communist propaganda and spectacular mass meetings lured many restless young people into a national uniformed group called "Free German Youth," much like the fervid Hitler organization. In 1950 they threatened to seize West Berlin, but backed down when Allied authorities said they would resist.

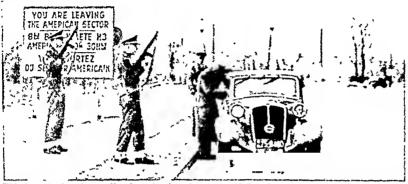
West Germany (Federal Republic) enjoyed wide political freedom. But the Allies continued to control industrial production. To aid economic recovery, they stopped dismantling factories. With the Beneluv nations, however, they set up an International Authority for the Ruhr. This allocated coke, coal, and steel to keep Germany from producing armaments. West Germany made substantial economic gaias, and in 1950 it voted to join the Council of Europe.

West Germany Increases Activity in Europe

West Germany moved steadily to greater participation in the life of western Europe. All the nations which had fought Germany in the second World War ended the state of war in 1951. The United States, one of the last to act, proclaimed the termination on Oct. 20, 1951.

In 1952 the Allies urged West Germany to join 3 European army raised to guard against Communist attack. Russia then proposed a pact to unify East and West Germany into one nation, forbidden to join any alliance against Russia. The Allies then offered a "peace contract" to West Germany. Refugees from East Germany kept streaming into West Berlin in 1953. West Germany joined the European Coal and Steel Community in 1953.

# ROAD BLOCKS DIVIDE CONQUERED BERLIN INTO FOUR SECTORS



This is a check point leading into the American zone of the giant city. Armed American military police watch as a German policeman checks the identity of people in the small European car. A sign in three languages warns Berlin traffic of the end of the American zone.

land permanently. Russia demanded 10 billion dollars of reparations in industrial goods from Germany.

When the Allies failed to agree, the Soviet zone withdrew from almost all communication with the American and British zones. France disagreed with both groups. But in 1948 the French joined their sector to "Bizonia," making it "Trizonia," or Western Germany. Participation in the European Recovery Program aided the recovery of Western Germany. Russia refused to let Eastern Germany get ERP aid.

"Cold War" Leads to "Air Lift"

When the Western Allies stabilized the currency of Western Germany in 1948 without Russia's consent. the Soviet Union left the Allied Control Council and the Berlin Kommandatura. Russia then defiantly imposed a transportation blockade on the freeway into Berlin. This shutdown on supplies threatened to starve West Berlin. Russia seemed determined to drive the Western Allies out of Germany by a "cold war."

But the blockade succeeded only in at last unifying the Western Allies. They at once pooled their resources in a gigantic "air lift." To feed 2,500,000 Germans and Allied personnel in their jurisdiction, hundreds of American, British, and French planes flew "Operation Vittles." They carried not only food and elothing and medicine but also coal and even machinerv to West Berlin. On May 12, 1949, the 328th day of the air lift, Russia removed the blockade. Its satel. lites needed the industrial goods of West Germany.

# Divide Nation into Two New States

But Russia's obstructionism had already shown that Germany could not soon be unified politically into

Thousands of East German workers roted against their Communist puppet government in 1953 In an effort to stir discontent in West Germany Russia in 1954 'recognized 'East Germany as a sovereign na

tion' but kept Soviet troops there West Germany ignored the sovereignty gesture and ratified the Allied peace contract It also agreed to join the European Army when the Allies set up that force

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GERRYMANDER (ger' ri-man-der). In 1812 the Democratic-Republican party was in power in Massachusetts but could not hope to retain its control in the approaching elections. To save something for the party Gov. Elbridge Gerry signed a reapportionment bill constructing at least one election district of exceptional unfairness. An exasperated Federalist editor hung a map showing this district over his desk. Gilbert Stuart, the painter, noticed the monstrosity one day and added head, wings, and claws, exclaiming, "That will do for a salamander." "Better say Gerrymander," growled the editor. The name for this political trick subsequently passed into common use.

The "gerrymandered" district may be a city ward. a legislative district, or a congressional district. The purpose is to pack hostile majorities into two or three districts, leaving the rest "safe" for the party in power and thus giving it a larger number of represen-

tatives than its votes really warrant.

THE GERRYMANDER-A POLITICAL BEAST



The original gerrymander was an absurdly shaped election district in Massachusetts. The article tells how it got its name.

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GERSHWIN, GEORGE (1898-1937). Americans had been singing and playing jazz tunes a long time before George Gershwin began composing. He was one of the first, however, to use jazz themes within classical forms. Today Gershwin's 'Rhapsody in Blue' and his Negro folk opera 'Porgy and Bess' are highly regarded both by serious students of music and by



those who love catchy melodics and engaging rhythms. His musical comedy songs have remained popular for many years.

Gershwin was born in Brooklyn, N. Y., on Sept. 26, 1898. Soon after, the family moved to the lower east side of Manhattan, where Morris Gershwin had a small chain of restaurants. George grew up as a typical city boy. When he was 12 years old, his parents bought a piano for his older brother, Ira. George astounded the family by picking out the tune of Rubenstein's 'Melody in F'. He had learned it by watching a player piano in a penny arcade.

He took piano lessons from neighborhood teachers and later studied under Charles Hambitzer, a wellknown musician. Altogether, however, his formal training was slight. At the age of 16 he quit high school to work as a "song plugger" for a music publisher, playing new songs for prospective buyers.

Gershwin's first song was published in 1916, and at 21 he wrote his first musical comedy, 'La La Lucille': That same year his 'Swanee', popularized by Al Jolson, became a nationwide favorite.

In 1924 Paul Whiteman commissioned Gershwin to write a short composition for a jazz concert to be given in New York's Aeolian Hall. Gershwin, hard at work on a musical comedy, barely finished the Rhapsody in Blue' in time for the concert. Its first reception was mixed, but Walter Damrosch asked him to compose a piano concerto for the Symphony Society of New York The result was the 'Concerto in F' In 1928 Gershwin went abroad to study composition But European composers and teachers advised him to follow his own methods. On this tour he wrote 'An American in Paris Gershwin's most successful musical comedy was Of Thee I Sing', which was a pleasant sature on presidential campaigns. His last major work was Porgy and Bess' He died at 38 of a bram tumor on July 11 1937

# GETTYSBURG—the TURNING POINT of the CIVIL WAR

CETTYSBURG, BATTLE OF On the first three days of July 1863 at the little crossroads town of Gettysburg Pa, was fought the most important battle of the Civil War Lee s Army of Northern Virginia had crossed the Potomac and

marched into Pennsylva ma It threatened Harrisburg the state capital and the North feared that the army might devastate Philadelphia and Baltimore Government lead ers were even fearful that Washington itself, al though protected by the powerful Army of the Potomac, might be taken

Lee'e invasion had two all important strategic purposes The Confeder acy hoped it would stir the people of the North to demand peace at any cost and would persuade England and other European nations to recognize the new government The bouth was at the peak of its nower. Its defeat at Gettysburg and the surrender (July 4, 1863) of Vicksburg began the with Lee a surrender two vears later at Appomattox Positions of the

Armies on June 30 Lee sarmy was made up of three corps I Corps under Gen James Longstreet, H Corps under

Gen R S Ewell, III Corps, under Gen A P Hill Ewell's corps had threatened Harrisburg Philadelphia and Baltimore On June 30 it lay north of Gettysburg Hill's corps bivousched at Cashtown, between Chambersburg and Gettysburg Longstreet's corps camped in and near Chambersburg General 'Jeb" Stuart Lee's chief of cavalry, was raiding the country east of Gettysburg and was out of touch with the Confederate commander

The Union army was made up of seven corps, each about half the size of a Confederate corps, plus cavalry Under a new commander, Gen George G Mesde, the army marched north to intercept Lee its movements hunted by the need to protect Washington On June 30 a brigade of Hill's corps intent on raiding stores at Gettysburg observed Union caralry in its

way and retired with the news to Cashtown

First Day of Barrie

On July I Leasent one of Hill's divisions toward Gettysburg It clashed with Federal cavalry and infantry at Willoughby Run immediately west of Gettysburg The fighting was severe and Hill amen were at first repulsed Then units of Ewell's corps coming from the north turned the Federals north flank The Federals were driven east and south over Saminary Rulge and through the town They took refuge on Cemetery Hill a half mile south of town Ewell although commanded by Lee to take Cemetery Hill "if possible" failed to drive forward and the Union army gathered its strength on the hill and extended defensive lines south along

Cemetery Ridge By nightfall the Confederates had captured some 5 000 presoners and inflicted considerable dam age on the Federal units They gathered on the bat-

tlefield more swiftly than the Federals and took positions on Seminary Ridge and mmediately south and east of town The battle line shaped up in the form of a fishhook, with the shank extending south along Cemetery Ridge and the curved book bending east from Cemetery Hill to Culp s Hill Lee still without cavalry, was hampered by lack of knowledge of Federal movements and strength Nevertheless, he determined to fight and ordered Longstreet to attack on the morning of July 2

Second Day of Battle Longstreet disgruntled because Lee had rejected his alternative battle plan, was slow in attacking



Lee a plan called for artillery bombardment and thrn a charge against the Federal center. Pickete is 5000 Idiaatrymen acreaming the spine-challing robely ell advanced ecross the open and up Gemelery Store Many reached Bloody Angle in spire errick Federal fire but thou failered below and extracted

Meanwhile, the Union army steadily built up strength along Cemetery Ridge and fortified the Peach Orchard,

a height west of the Ridge.

Longstreet did not begin the battle until four o'clock in the afternoon. He was repulsed from Little Round Top but took the Peach Orchard. One unit even reached the Union line atop Cemetery Ridge but had to withdraw. To the north and east the Confederates limited the attack to a cannonade until six o'clock. Then Ewell made unsuccessful attacks on Cemetery Hill and Culp's Hill.

In spite of repulse, Lee determined to carry on the battle. He ordered Longstreet to throw Pickett's division at the center of the fishhook's shank and to support this drive with other units of his corps. He also assigned units from Hill's corps to join in the attack. In the late afternoon of July 2, Stuart's exhausted cavalry joined Lee. Along Cemetery Ridge the Union forces continued to build up their strength.

Last Day of Battle

Again, the next day, the start of battle was delayed. It was not until 1:00 p.m. that the Confederate cannon began to throw shells at Cemetery Ridge. Union guns answered ficrcely, and soon the battleground was overlaid with heavy clouds of smoke and dust. After a time Meade slowed the Federal fire to conserve ammunition. The Confederates thought the fire lessened because their own cannonade had destroyed a large number of Federal guns.

At two their attacking force, 15,000 men in splendid alignment, began the advance. Union grape and canister tore great holes in the advancing line, but the Confederates closed the gaps and marched on.

Union skirmishers retreated behind the stone wall on Cemetery Ridge, and Union rifles began to take toll. Nevertheless, the Confederates came on. They halted once—to fire their rifles—and then lowered their bayonets, screamed the rebel yell, and came on at a run. The Federals retreated from the sheltering stone wall before this furious attack. From either flank Federal cannon and rifle fire enfiladed the Confederate advance. It was too punishing, and the Confederates withdrew in some disorder.

Battle Costs and the Retreat to Virginia

Lee's Army of Northern Virginia totaled about 75,000 officers and men; Meade's Army of the Potomac, about 88,000. The Confederate loss in dead, wounded, and missing was about 28,000; the Union loss, about 23,000. After the battle Lee could not hope to maintain his defeated army in enemy territory.

During the night of July 3 and the morning of July 4, the Confederate wounded were loaded aboard ambulances and wagons. These and supply wagons began the journey west beyond the mountain curtain and south. Rain impeded the disengagement. Lee prepared his line on Seminary Ridge against Union attacks. But none came. On the morning of July 5 he finished his withdrawal and, covered by Stuart's cavalry, began the retreat to Virginia. At the Potomac he was held up by loss of a pontoon bridge and high

water. Meade's pursuit was slow. Lee got most of his men safely across the river.

Meade has been severely criticized for his failure to closely pursue Lee's army. But his army too had been badly hurt. The belief that the Civil War could have been ended by a vigorous pursuit of the defeated Confederates is after all but a guess.

Today the little town of Gettysburg stands amidst many memorials of the great battle. At the dedication Nov. 19, 1863, of a national cemetery atop Cemeter, Hill, President Lincoln delivered his famed Gettysburg Address (see Lincoln). In 1895 the battlefield became a national military park; on it have been erected more than 2,000 memorials of various kinds and sizes. In 1938 the Eternal Light peace memorial was lighted. Its gas flame burns endlessly in memory of the fallen Blue and Gray soldiers. (See also Civil War. American; Lee, Gen. Robert E.; Meade.)

GEYSER (\$\vec{y}'z\vec{e}r\$). A hot spring that spouts steam and water is called a geyser. The name comes from the Ieelandic word geysa, which means "to rush funously." Geysers occur in regions of relatively recent volcanic activity, where rock not far below the surface is still very hot. Geysers are found in Yellowstone National Park, Iceland, and New Zealand.

The mouth of a geyser is either a funnel-shaped erater or a built-up cone, made up of silica and other minerals brought up by the steam and water. Some geysers spout only a few feet, others hundreds of feet. Some spout infrequently, others at short intervals. Yellowstone's Old Faithful spouts approximately every 65 minutes.

Why a Geyser Spouts

Two theories of geyser action have been offered. In 1846 Robert Bunsen stated that water was kept in contact with hot rocks near the bottom of a geyser tube by the pressure of water above. Water under leavy pressure can boil only at temperatures higher than the sea-level boiling point of 212° F. Consequently, the water reached superheat before boiling and turning into steam. When steam was produced, it pushed the top water out of the tube, thus lessening the pressure below. Because of the lighter pressure all the superheated water exploded into steam and rushed out of the tube.

A. L. Day and E. T. Allen, from their study of Yellowstone geysers in 1936, believe that there are connecting tubes or chambers. Steam is generated by hot rock in one, and when the pressure of the steam is great enough it rushes into the other, pushing the water above the junction into the air. Yellowstone National Park; Iceland; New Zealand.) GHENT (gent), BELGIUM. The port city of Ghent stands at the meeting of the Lys and Scheldt rivers in western Belgium, a few miles from the sea. A great canal gives ships passage to its docks. A network of smaller canals within the city is spanned by more than 200 bridges. Ghent's trade is largely agricultural and manufactured products. Because it also exports great quantities of flowers, it sometimes is called the "City of Flowers." Ghent's chief modern industries are cotton and flax spinning cotton printing and sugar refining. It has a national university

Medieval Ghent was a prosperous center of the cloth industry. Within the old city's cight-mile circumference he extensive promenades large gardens and many old buildings. In its center surrounded by walls and mosts are the famous Cathedral of St Bacon, guild houses monasteries and a 13th-century nunnery 'Roland" a bell that called Chent's men to arms when danger threatened still hangs here In the Middle Ages Ghent's turbulent wealthy burghers quarreled endlessly with their lords But when the rival city of Bruges threatened Ghent a lords and burghers united to fight a common enemy The treaty that ended the War of 1812 was signed here Population (1947 census), 166 096

GHIBERTI (ge bir'te), Lorenzo (1378-1455) Michelangelo said of the bronze doors Lorenzo Ghi berti made for the Baptistery in the Italian city of Florence "They are beautiful enough for the gates of Paradise" Their creator a sculptor, painter and

metalworker, was a leader in the Renassance Gluberts, like many of the Renaissance artists was trained in gold working. He master was his stepfather, Bartoluccio In 1400 Gluberts left Florence to escape the planue but he returned to enter a contest sponsored by the merchant guilds to select a designer for two bronze doors The contestants were to depict on a panel the Sacrifice of Isaat Even Chiberta s closest rival, Brunellesche later a famous architect, admitted the superiority of Chiberti's panel

Ghiberti was aided on the doors by his stepfather and his son. The panels depict stories of Christ and the Church Fathers The project took 21 years Meanwhile Ghiberti completed much other work

After the doors were installed. Chiberti was commissioned to make a second set These, the ones that evoked Michelangelo's praise took 29 years to complete The panels depict Old Testament stories Boidering strips carry sculptured heads in high relief of Ghiberti and men of his time (For picture, see Renaissance \ During World War II the doors were hidden for safekeeping Before they were reinstalled they were cleaned It was then discovered that the gold lesf with which they were originally covered was almost intact Ghiberti also wrote a history of art. This manu script still exists. His and Brunelleschi's contest pan

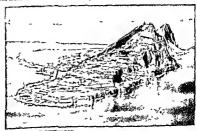
els are displayed in the National Museum in Florence Ghiberta died Dec 1 1455

GIBBON The smallest and least known of the anthropoid apea the gibbon is in some ways the most manlike The several species are native to Southeast Assa One of the commonest is the white handed gibbon (Hylobates lar) It grows 21 to nearly 3 feet tall. but weighs only 8 to 12 pounds. It has a france of white hair around a black naked face and white or straw-colored hair on top of its hands and feet. Its arms are very long. The male's thick woolly coat is generally black the female s often tawny or yellowish

The gibbon lives mostly in trees It can swing 20 to 40 feet from one branch to another The gibbon sits as erect as a man. It eats leaves fruits spiders birds and eggs. It makes no home but sleeps on any convenient branch The male his mate and their young are always together. The young remain until they find mates of their own usually at the age of six Thue a family may contain 8 or 9 individuals. In the wilds a gibbon lives to be 20 to 30 years old but in a zoo its life is much shorter (See also Ape )

GIBRAL/TAR Near the southern tip of Spain a narrow poningula points a finger to the coast of Africa, 15 miles away Here the Rock of Gibraltar guards the western gateway to the Mediterranean Since 1704 Gibraltar has been a fortress a crown colony of Great Britain and its chief may all base on the route through the Sucz Canal to the Far East

The peninsula about three miles long and less than a mile wide covers about two equare miles The rock. mostly limestone is honeycombed with tunnels and a few natural cases. The sides are studded with gune pointing to lan I and sea the top bristles with antiaureraft guns. The steep eastern slope nices 1 400



THE ROCK OF GIBRALTAR The British fortress of Gibralius guards the western entrance to the Mediterranean. In the background is the coast of Spain The Rock rises 1 400 feet above the sea.

feet above the Mediterranean. At the north end of the peninsula an uninhabited strip between British and Spanish boundaries is designated "neutral ground."

The city of Gibraltar, mostly on level ground on the west of the rock, lies on the deep Bay of Gibraltar. Its industries are unimportant, but the harbor is a port of call where passenger and cargo ships take on fuel, stores, and water. Vast reservoirs for rain water have been blasted out of solid rock, and artesian wells have been drilled in the tunnels.

Aliens must have a British permit to live on the peninsula. Gibraltar and the opposite cape of Africa (which holds the Spanish town of Ceuta) were called

"Pillars of Hercules" by the Greeks. They did not dare sail beyond. The name "Gibraltar" is a corruption of Jebel-al-Tarik (hill of Tarik). Tarik, a Mohammedan, led troops across the straits in A.D. 711 and built a fortress on the rock. Since its capture by the British in 1704, Gibraltar has withstood a number of sieges. In the greatest (1779-83) the British held off combined French and Spanish forces. During the second

World War Gibraltar was a naval and air base. These bases were important in the invasion of Africa in 1942. It withstood many air bombings. Population, including garrison (1951 census), 23,232.

GILBERT and SULLIVAN. Since 1875 the rollicking comic operas of Gilbert and Sullivan have played to millions of people all over the world. Between 1871 and 1896 the two created music and words for 13 operas. All except three have been revived again and again.

Gilbert was the librettist. His amusing, hilarious rhymes and tricks of phrasing colored and gave variety and vigor to his topsy-turvy plots. Sullivan wrote the music. His lighthearted tunes have been hummed, whistled, and played ever since. Although in collaboration the two perfectly complemented one another, they were physically and characteristically unlike. Gilbert was tall, sour, brusque, and irascible; he married in 1867. Sullivan was small, dark, suave, and pleasant; he never married. Gilbert was impatient with royalty and officialdom; Sullivan was a friend of the Prince of Wales and other royalty. These differences made for frequent spats.

William Schwenk Gilbert (1836–1911) was first a government clerk, then a lawyer, and finally a dramatist. He was born Nov. 18, 1836, in London. While at Ealing School he wrote several student dramas. He attended King's College. The verses he wrote while studying law, first published in papers and magazines, were collected in two books, 'Bab Ballads' and 'More Bab Ballads'. Until he collaborated with Sullivan, he was a successful but not outstanding dramatist.

Arthur Seymour Sullivan (1842–1900) was Victorian England's most famous composer of popular and sacred songs and oratorios. 'Onward! Christian Soldiers' is his best-known hymn; 'The Lost Chord' is one of his popular songs. Sullivan also was born in London, on May 13, 1842, the son of a poor Irish musician. As a boy, he was a soloist with the Chapel Royal choristers. His pleasant manner and superior talents won him scholarships at the Royal Academy of Music in London and at the Leipzig Conservatory in Germany. His 'The Tempest', based on the Shakespearean play of that name, won him fame before he was 20 years old

Gilbert and Sullivan met in 1870, and within a year their first opera 'Thespis' was played. It was not successful, and the two did not again join efforts

until 1875. Then they created 'Trial by Jury', which poked fun at the judiciary. The opera's one act played only 45 minutes, but it attracted large audiences.

They had written it for Richard D'Oyly Carte, a theatrical producer. Within three years he formed the famous D'Oyly Carte Company to produce Gilbert and Sullivan operas; and producer, writer, and composer alone shared the large profits.



Their zany, fun-loving, and lilting light operas have delighted the world for many years.

Their most successful operas are: 'The Sorcerer', 1877; 'H. M. S. Pinafore', 1878; 'The Pirates of Penzance', 1879; 'Patience', 1881; 'Iolanthe', 1882, thought to be their finest; 'The Mikado', 1885, their biggest success; 'The Yeoman of the Guard', 1888; and 'The Gondoliers', 1889, another great success. After 'The Gondoliers' the partners quarreled furiously—over who should pay the cost of new carpeting for their theater, the Savoy. The failure of 'Utopia Limited', 1893, and 'The Grand Duke', 1896, probably can be blamed on this quarrel.

Before Gilbert and Sullivan, England had produced few noteworthy comic operas, and the best were but poorly realized and staged. Gilbert's topsy-tury plots, zany rhymes, and careful staging and Sullivan's superb music established a new art form. The essence of Sullivan's music cannot be given in words, but Gilbert's uproarious verse can. In 'H. M. S. Pinafore' the first Lord of the Admiralty sings of the reason for his success:

I cleaned the windows and I swept the floor, And I polished up the handle of the big front door. I polished up the handle so carefullee

That now I am the Ruler of the Queen's Navee! and in 'The Pirates of Penzance' the pirates are forgiven because—

They are no members of the common throng; They are all noblemen who have gone wrong! Gilbert's caricatures of government and officials angered Queen Victoria. Sullivan was knighted by Queen Victoria in 1883. Gilbert had to wait for Edward to ascend the throne; he was knighted in 1907. Sullivan died Nov. 22, 1900; Gilbert, May 29, 1911.

GINGER The spicy flavor of ginger is found in cakes and cookies, pickles and preserves roast meats, mincemeat, and ginger ale. A popular British soft drink is ginger beer. Ginger is one of the oldest known spices. Its use is mentioned in the ancient Sanskrit literature of India and the Greeks and Romans early imported singer from that country During the Middle Ages it was so scarce and valuable that a pound of it was worth a whole sheep. The early Spanish conquistadors planted ginger in Jamaica, and by 1550 Jamaica was exporting it to Europe in large quantities Today ginger is grown in the West Indies. China the Indian peninsula, and West Africa

The scientific name of the ginger plant in Zingiber officinale It is a reedlike perennial similar to the me or flagroot. The aromatic rootstocks yield the ginger Another member of the ginger family (Zings beraceae) is turmeric, the roots of which are powdered and used for medicine, for a yellow diestuff, and for a condiment in mustard and curry pender

Green ganger preserved in sugar syrup or honey comes from China Other ginger growing countries export dried ginger in chunks or powdered form Dried ganger varies in color from light yellow to brown Jamasca ganger the best quality, is light yellow Some ginger flavoring is sold as tincture

of gunger, an alcohol solution

GINEGO (ging'ko) Before the Ice Age the broadtrunked spreading ginkgo tree grew widely in the temperate zones of both the Northern and Southern Hemispheres Now it is native only to China and Japan In Chinese temple gardens there are gunkgos believed to be more than a thousand years old. The beauty of the ginkgo foliage has brought its adoption as a shade tree in many sections In Washington, D C, the ginkgo is extensively planted along the strests and in the parks

The ginkgo grows to a height of 120 feet, with a trunk diameter up to eight feet. It has numerous slender branches and fan-shaped fernlike leaves These resemble the maidenbair fern, and the ginkgo is sometimes called the 'maidenhair tree" The yel low-orange fruit resembling a plum has a dragreeable-smelling outer portion and an inner eval but The nut contains an oily edible seed with a combine taste The Chinese and Japanete consider the puts

a delicacy GINSENG For many centuries the Chinese built a host of legends and superstitions around the ginseng plant They believed that its roots were a remedy for every illness capable of prolonging life and even of restoring it after death. Their legends told how wild animals protected the plants from harm and how the roots sayed themselves from capture by mov ing from place to place underground

The beliefs arose partly from the fact that graseng roots take curious shapes, roughly resembling the outline of a human figure The picture at the right shows some of these forms Among the ancient Hebrens the mandrake root which also THE SCARLET GINSENG BERRIES



After several years' growth, the guacus plant shows a rich cluster of scarlet berries. The roots are ready for gether-ing, and the berries will provide seeds for new plants.

ODD SHAPES OF GINSENG ROOTS



cial value of ginveng roots lies in their odd shapes a and other Oriental people see in these roots a mblance to the human form, and from the supposed

assumes oddly familiar shapes—was regarded with the same awe and superstition.

Western medical scientists can find no medical value in ginseng, but the Chinese are still willing to pay high prices for it. For a time in the 19th century, the American species of ginseng, Panax quinquefolium, was the United States most valuable export to China. In the 1930's the United States still shipped an annual 2 million dollars' worth of ginseng. The Manchurian and Korean species, Panax ginseng, is even more valuable; an ounce of selected root has brought as much as \$200. Both species grow wild; the American ginseng has also been cultivated for the Chinese market. Marketable roots take about six years to grow from seed.

GIORGIONE (gōr-gō'nā) (1478?-1510). In his own day Giorgione was hailed as one of the greatest Itahan painters. He led his fellow artists away from their concentration on religious portrayals into the wider field of subjects offered by Greek and Roman mythology. Titian and later Tintoretto and Veronese were strongly influenced by Giorgione's choice of subjects and his technique (see Titian). Unfortunately, many of Giorgione's paintings were frescoes, made on freshly spread, wet plaster walls. Some of these wall paintings disappeared when the buildings crumbled or were wrecked. The remaining ones are faded, cracked, and peeling. Giorgione did not sign his paintings on canvas; and scholars are not sure that some works attributed to him are actually his.

Little is known of Giorgione's life. His real name may have been Giorgio Barbarelli; he was also called Giorgio of Castelfranco, from his birthplace. Giorgione means "Big George"; he won this nickname both for his size and for his reputation as a painter. He studied at the studio of Giovanni Bellini, where Titian was a fellow pupil. Giorgione was known in Venice society as an accomplished singer and lute player, fond of feminine company. He died of a plague when he was in his early 30's.

Among Giorgione's famous paintings are 'Sleeping Venus', 'The Tempest', 'Madonna with Saints', and 'Concert Champetre'.

Giotto (gôt'tō) (1266?-1337). Painter, sculptor, architect—Giotto stands out boldly as the first genius of art in the Italian Renaissance. Giotto lived and worked at a time when men's minds and talents were first being freed from the shackles of medieval restraint. He dealt largely in the traditional religious subjects, but he gave these subjects an earthly, full-blooded life and force.

Giotto's full name was Giotto di Bondone. He was born about 1266 in the village of Vespignano, near Florence. His father was a small landed farmer. Giorgio Vasari, one of Giotto's first biographers, tells how Cimabue, a well-known Florentine painter, discovered Giotto's talents. Cimabue saw the 12-year-old boy sketching one of his father's sheep on a flat rock and was so impressed with his talent that he persuaded the father to let Giotto become his pupil. Another story is that Giotto was apprenticed to a wool merchant in Florence. The boy frequented Cimabue's studio so much that he was finally allowed to study painting.

The earliest of Giotto's known works is a series of frescoes (paintings on fresh, still-wet plaster) on the life of St. Francis in the church at Assisi Each fresco depicts an incident; the human and animal figures are realistic and the scenes expressive of the gentle spirit of this patron saint of animals.

Between 1304 and 1306 Giotto painted a notable series of 38 frescoes in the Arena Chapel in Padua. The frescoes illustrate the lives of Jesus Christ and of the Virgin Mary. Over the archway of the choir is a scene of the Court of Heaven, and a Last Judgment scene faces it on the entrance wall. The compositions are simple; the backgrounds are subordinated; and the faces are studies in emotional expression.

Vasari tells the story of how Pope Boniface VIII sent a messenger to Giotto with a request for samples of his work. Giotto dipped his brush in red and with one continuous stroke painted a perfect circle. He assured the messenger that the worth of this sample



This oil painting by Giorgione now hangs in the National Gallery in Washington, D. C. The picture shows his great skill at assembling figures and landscape into a pleasing composition.

GIOTTO & BELL TOWER



1900 a campan le stands next to Florence s cathedral Santi 1811 del Frore in the Practe del Duomo. The tower calle to innestratucine of 128 min in 12 y next 202 feet and its made fred green and white marble. Gootte designed the sweet aster Grotes of the standard of the sweet and the way it began. It was comp etche by And as Practo on delication first Grotes death. Visitors are afforded a fine e or florenced after Grotes of the Santian Santian Santian Santian Santian after Grotes of the Santian S

would be recognized. When the pope saw it he in stantly perceived that G otto surpassed all other pa aters of his time.

In Rame Angles and Florence Gorde evecuted commences from per near and high clustomer. In the Bargello or Palace of the Pedest's (non a national antewam) in Florence is a sense of his Biblical senses. Among the bystanders in the paintings is a portact of his freed the poet Danie. The Chirol of Sunta Groce is adorned by Giotto murals again dept and ghe 16 of St France.

In 1334 the city of Florence honored Grotto with the title of Magnus Vagaster (Great Master) and appointed hum city arch text and superintendent of public works. In this espacity he designed the famous campan le (bell tower). He died in 1337 before the work was functived.

Grotto was short and homely and he was a great wit ansi pract cal joker. He was married and left s's children at is death. Unlike many of his fellow art sta be save i his mo cy and was so ounted a rich man. He was I kinn at terms with the pope and King Role et of vaples called him a go of if end

In common w th other activits of his day Giotte hack if the technical knowledge of announcy and I per spect se that litter painters levined Yet what he prosessed was suit bely re ster thin the technical little sit the sit to who followed him. He had a group of human encolous and of will at was 8 pit facinit minna life. In concentrating on these eventuals he created compelling per diverse of people caught up n rives and soil starching, does not make the control of the

Charte The tables of all living an melt is the safe. Deen more pecular than its as as the shape of the African animal which has into red on the shape of the African animal which has impred amisement as eac ancent intend \* The table graffe may grow to be from 16 to 20 feet that 'I' to female is converbal shock for its body is smaller than that of the average horse that the same and the same anew and the same and the same and the same and the same and the sa

When you watch a guraffe feed you see at once how this peculiar build enables it to get food. The graffe is a plant eater and with its great he glith it can reach up to the leaves of tree. Hence it can thrive in semiarid tropical lands which have trees the the momess but it the or no grass.

In every detail the guaffe is splendidly adapted to the tree browsing habit. The tongue may be a foot and a half long and the guaffe also has a long upper lip. With the two it can easily wrench toose mouthfuls of leaves. The knees and hock joints

are padded with callosities like those of the camel for resting on stony or sandy ground. Finally, the thick hide is covered with short hair, mottled brown and yellow. This coloring blends beautifully with the play of light and shadow when the giraffic is browsing among mimosa trees, and the animal is all but invisible. (For picture in color, see Africa.)

### Additional Peculiarities of the Giraffe

The eyes of the giraffe arc described as wonderful in beauty of coloring and in expression. The hoofs are cleft and dainty in shape. The nostrils are prominent and can be closed at will like those of the camel.

The neck has a short soft mane. Between the ears are two bony hornlike projections covered with skin and surmounted with bristles. In front of and between these projections is a rounded bony clevation which appears like an undeveloped third horn. In one species both males and females possess horns; but usually the horns are confined to the males.

The giraffe cannot trot, but it runs in a ponderous gallop. Arabs with fleet horses can scarcely overtake it. The flesh is in great demand for food, the skin is used for leather, and the tail tuft is used for fly brushes.

The giraffe has a reputation for being voiceless because the low, throaty sound it makes is little noticed. The fawns bleat like lambs. Both sight and hearing are keen and it is very intelligent. Although it is good-natured and gentle, it will fight in self-defense. It can use the head on its long neck like a sledge hammer to THE GIRAFFE AND HIS SHORT-NECKED COUSIN



The mottled giraffe lives in open country, with occasional clumps of trees, while the claps of trees, while the chap (at the left) is a forest dweller. The color and markings of each animal help to conceal it in its own surfoundings.

deal heavy blows. It is said that in defense of her young a female giraffe has killed a lion.

Giraffes usually live in small herds. They chew their cud while standing creet, and wary hunters have sometimes come upon specimens leaning against trees, fast asleep.

Giraffics were known to the ancient Egyptians and Greeks, and many were exhibited in the old Roman games. They were thought to be a mixture of camel and leopard, and were called camelopards.

These animals formerly ranged across the African continent from the Indian Ocean to the Atlantic. Now they are confined to the plains of eastern Africa between the Sahara Desert and the Zambezi.

# The Rare Okapi, Relative of the Giraffe

In the northeastern portion of the Belgian Congo lives the okapi, a near relative of the giraffe. This animal was unknown to civilized man until 1900, when Sir Harry H. Johnston, the English naturalist and explorer, learned of its existence from Congo pigmies and obtained an imperfect skin and two skulls. So elusive is this

creature and so perfectly camouflaged that specimens of it are exceedingly rare. The purplish-red color of the okapi's body, with its striped black and white forelimbs and hindquarters, blends admirably with the vegetation.

The full-grown okapi is much shorter than the giraffe, measuring less than five feet from the shoulders to the ground. It has a short, stout neck and a deerlike head. The male has horns shaped like those of the giraffe. These animals feed on roots, stems, and leaves, pulling in the food with their long tongues. Their thick, tough skins enable them to pass unharmed through the jungle undergrowth.

The okapi and the giraffe are the only members of the family Giraffidae, and are ruminant (cud-chewing) animals. They belong to the even-toed ungulates (order Artiodactyla). Zoologists classify them between the deer and the antelope. Scientific name of the giraffe, Giraffa camelopardalis; of the okapi, Okapia johnetoni.



## SCOUTING with GIRLS of MANY LANDS

IRL SCOUTS When Lord Robert Baden Powell organized the first Boy Seout troop in 1908 he had no idea that he was preparing the way for a world wide program of scouting-a program in which girls as well as boxs would take part (see Box Senuts) But when in 1910 he called the Row Scouts to meet him in London he was faced by a small but determined group of gurls who had accommanied the r Scout brothers to the meeting These girls insisted that they wanted to be scouts too so that they as well as their brothers could enjoy the scoutme program of work and play

With the aid of his sister Miss Agnes Baden Powell he met the surla demand by organizing the Gul Guides The organization has since spread to many other countries and more than a million and a half surls are benefiting by the persistence of that I ttle group of English girls who made themsel es

a place in the scouting program although they had not been invited! All the Girl Scouts and Girl Guides of the world follow substantially the same promise and laws A Girl Scout a uniform is a passport of friendship in elmost any country she may vi it

Mrs Juliette Low a friend of Lord Baden Powell carried the idea of Girl Guiding (or Girl Scouting as it soon was called) to the United States and organ ued the first Girl Scout troop m her home in Sa-Vannah Ga March 12 1912 Unt I her death in 1927 Mrs Low gave generously of her time money and en thusasm first to develop Girl Scouting in the United



States and later to make it known elsewhere. A book.

Juliette Low and the Girl Scouts tells her story

In 1950 Congress passed a law incorporating the Girl Scouts as the Grl Scouts of the United States of America and setting up a National Council of Girl Scouts This law requires the corporation to make an

annual report to Congress

Thousan is of women have found new friends and in terests as leade a of G rl Scout groups. The organi zat on offers special training courses for leade a

The Girl Scout program is based on the things girls are most interested in and gives them an opportunity

to learn much that they need to know if they are to I ve happy useful lives. It covers such general fields as health and the outdoors homemaking community service and special interests such as writing arts and crafts or other hobbies A Gurl Senut knows how to combine real fun with worth

while activities Gul Scouting activities are planned to meet the needs and interests of three age groups girls from 7 through 9 (Brownie Scouts) garls from 10 through 13 (Inter mediate Scouts) and puls 14 through 17.

or m hash school (Senior Scouts) The Brownies are organized in groups, each containing from six to sixteen girls. They go to camp just as their older sisters do They make friends with the animals in

the camp and watch the behavior of the tur tles and the frogs and other water life They learn to be helpful picking up their toys and helping to set the table at home They make up their own songs and stories



The Girl Scout Little House in the nation's capital is

PPY EVENING AT CAMP

and dramatize them at the camp fire. When Brownies are 10, they "fly up" to become Intermediate Scouts.

The Intermediate Scout learns the Girl Scout promise and laws and understands that she must make them a part of her life. She makes herself use-

ful by packing Christmas baskets to be distributed by welfare organizations or by bringing gifts and a bit of cheerful song to shut-ins and old people. Many Girl Scout troops raise money to help flood sufferers and other victims of disaster. The Girl Scout goes camping and hiking. She knows trail signs to guide her in the woods and she learns to make herself comfortable with a minimum of equipment She learns what food she should eat and how much rest she should have to keep herself healthy. She learns to carry herself well. She earns or saves monev for a woods-green uniform.

The Scnior Girl Scout, 14 years old or more, may continue with many of the activities of the younger Scouts, adapted to her own age level, but she may also follow up the more specialized interests that girls of her age often have. She may already be thinking about a position and she probably wants to discover

how she may take her part in a wider social life with poise and graciousness. Her Scout troop helps her to face the changing conditions of modern life by awakening her to the problems of citizenship, and by offering her opportunities to develop leisure-time hobbies and to learn the requirements of some of the kinds of work open to women.

Intermediate Girl Scouts can win pro-

ficiency badges in 11 fields of interest: agriculture, arts and crafts, community life, health and safety, homemaking, international friendship, literature and dramatics, music and dancing, nature, out-of-doors, and sports and games. The badges are of four classes: Tenderfoot, Second Class, First Class, and Curved Bar. Senior Girl Scouts have an additional field. vocational exploration.

All Girl Scouts are members of an international organization, "The World Association of Girl Guides and Girl Scouts." Through the international letter box, Girl Scouts in the United States correspond with groups in other countries. By thus learning about their sister Scouts they pro-THE LITTLE HOUSE AT WASHINGTON, D.C.

mote international good will.

Each year, except when war makes it impossible, some Girl Scouts from the United States are sent to "Our Chalet," the permanent international meeting place of the Gul Scouts at Adelboden, Switzerland. There they make friends with Guides and Scouts from other countries and lay the basis for future international understanding. "Our Chalet" is a gift of Mrs James J. Storrow of Boston, the annual meetings there are financed by the Juliette Low Memorial Fund, set up in memory of the founder of Girl Scouting in the United States

and early state of the horse of John Howard Payne at East Hampton, L.I., which inspired his famous song, 'Home, Sweet Home'. Girl Scouts use it for meetings and varied activities Girl Scout troops are usually divided into patrols of from four to eight girls. These patrols plan special activities and cleet a patrol leader who meets with the other patrol leaders, the troop scribe, the troop treasurer, and the troop captain and her licutenant to plan the program of the troop as a whole. The

troops generally

meet once a week. During the summer many girls go to one of the numerous Girl Scout camps that are scattered through the country. It is hoped that ultimately every Scout will have at least two weeks each year in camp.

There are more than a million Girl Scouts in the United States. Each Scout pays a dollar a year as national dues Information about the

After a husy day outdoors, Girl Scouts like to gather around the fire for an evening uf reading or storytelling.

Girl Scout program and activities is contained in the Leader's Guide to the Brownie Scout Program', 'Girl Scout Handbook', 'Senior Girl Scouting', and 'Leadership of Girl Scout Troops-Intermediate Program'. These books and a catalog of other Girl Scout publications may be obtained by writing to Girl Scouts of the United States of America, 155 East 44th Street, New York 17, New York.

The Girl Scout promise is this

on my bonor I will try
To do my duty to God

and my Country
To help other people at

To obey the scout laws
The laws of the Gurl
Scouts are these

1 A Girl Scout s honor is to be trusted

 A Girl Scout is loyal
 A Girl Scout a duty is to be useful and to help

to be useful and to help others 4 A Girl Scout is a friend

to all and sister to every other Girl Scout 5 A Girl Scout is courte-

6 A Girl Scout is a friend to animals

7 A Girl Scout obeys orders

8 A Girl Scout is cheerful 9 A Girl Scout is thrifty

9 A Girl Scout is thrifty
10 A Girl Scout is clean Grain thought word and South

Tha Gri Scouts motto is 'Be prepared Their slogan is Do a good turn doily Their pans a trefol with the initials G S and the American eagle in low relief

GLACIER Of all the sculptors tools at work carve may and pollulum, the face of our earth perhaps the strangest and most awe onsprung; as the glacer a great river or zee at fee pouring invasibly down a measure side carrying huge boulders breaking off hillader building up walls and mo nick of stone more grandly than ever an Egyptian king built up the pyramids But they work slowly, imprecept they over the long years. They look as still and motionally such as the state of the state of

In many of the world a hall mountains the heat of summer is not sufficient to make all the snow is the falls in winter. And wherever the soccurs year after year the amount which accumulates in the upper clads of mountain valleys comes to be very great. These areas where the snow hast from year to year are known as anow fields. In the sunny days of summer the surface anow of a snow field melts and the water smaling into the snow freezes breaked as a similar too the snow freezes breaked as a state of the snown above also compacts the snow helow. By the melting and refrening of the water and by pressure the larger part of the snow of a snow field schaged into its Clustellow the snow above also compacts the snow helow. By changing the snown above also compacts the snow falls as changed into its Clustellow the snow at the top the changed into its Clustellow the snow at the top the

WHERE ICE FLOWS IN A SLOW WHITE RIVER



Rew Zealand Such travespect are of an produced when a giac or eath some does In the foreground to Castle Rock tee is not very compact but farther below the surface

it is sold. A soow field is therefore really an icefield only overed with snow.

When the snow and ice become sufficiently deep the ree beg as to creep down the alops. Ice which has this slow excepting movement down a mountain valloy from a snow field above is a valley glacier. As it moves with treemedous force it carries along masses

is move with transmotoriers to carries song masses of rock and these act as cutting tools. With these tools and the results that glacer deepens the orn and valler from sheers off and widens its aides. The valley which remains after the glacer has retreated is Ushaped whereas a stream-cut valley is Vehaped. A typical glace exerated valley is the beautiful Yosem its few Yosemuth National Parch.

Washington has more glaciers than any other state. In western Miontana an area has been set aside as Glacier Nat onal Park (ree Glac er Nat onal Park). In western Canada Alaska the Andes the Alps and old er buch mountains there are also many valley glaciers.

There is another great type of glace or which is not a valley glacer. When the snow and rea accumulate in quantity on a plan nor a plateau it moves out from the center in all directions. This sort of a glacer is an one cap if it is very large it is a continental of the content of the conten

Glaciers move at the rate of a few inches or a few

feet a day. There are perhaps glaciers which move as much as 100 feet a day, but few of them move more than three or four feet. During the movement, the ice is cracked, especially where the ground over which it passes is rough. Thus arise the big cracks or "crevasses" which make travel across glaciers difficult and dangerous.

As the ice moves it gathers up great masses of earth and stones. This debris, carried either on top of the glacier, or frozen within or underneath it, eventually forms belts or ridges known as "moraines" which are sometimes 25 to 100 feet high. A rounded, elongated moraine whose longer axis points in the direction of ice movement is called a "drumlin." The unassorted, jumbled mixture forming the moraines and drumlins is known as "glacial till" or "boulder clay," while the general term "glacial drift" includes all material which may be deposited by glaciers, regardless of its form or nature.

The huge ice cap, which formerly covered about 4,000,000 square miles of the northern half of North America, produced great topographical changes by eroding the surface of the land and by depositing drift. This production of surface changes by glacial action is called "glaciation," and a country which exhibits them is said to be "glaciated." (See Ice Age.) GLACIER NATIONAL PARK. "The Alps - right here in the United States!" This is the first cry of the visitor to that mountain wonderland in northern Montana where 60 living glaciers wind in and out among chains of unscaled crags glistening with ice and snow; a place where waterfalls tumble down dizzy precipices, edged by primeval forests; where 250 lakes lie cradled among giant peaks, and where enchanted streams wander through wildflower gardens.

This public park has been called "the roof of North America," for from its mountain heights the waters divide and flow into the Gulf of Mexico, into Hudson Bay, and into the Pacific Ocean. It was once a favorite haunt of the Blackfeet Indians, but when copper was discovered there in 1890 the white man found his way to this home of the mountain sheep, and in 1896 Congress bought it from the Indians. But the copper deposits were not large enough to pay for mining them, and so the region was turned into a national park in 1910. Today the wilderness of about 1,560 square miles is dotted with camps, cabins. and modern hotels. In 1932 Glacier Park and the adjoining Waterton Lakes National Park in Canada were combined to form the Waterton-Glacier International Peace Park. (For illustration in color, see National Parks.)

GLADIATOR. "We who are about to die salute you!" Such was the cry with which the gladiators or professional fighters of the Roman arena saluted the Emperor as they marched about the amphitheater before engaging in combat with one another, or with wild beasts, for the entertainment of the populace. For the most part they were prisoners taken in war, slaves, or the worst classes of criminals. When a gladiator was disabled or disarmed, if the spectators

turned up their thumbs the vanquished man was to be spared, but if they turned them down he was to be slain. The successful fighter was at first rewarded with a palm branch, but in later years it became the custom to add to this rich and valuable presents and a prize of money.

The custom of giving gladiatorial shows seems to have been borrowed from the Etruscans, who sacrificed slaves and prisoners on the tombs of illustrious chieftains. The first combat in Roman history took place in 264 B.C., and the fashion rapidly spread Julius Caesar gave a show at which 320 couples fought, and the Emperor Titus (79–81 A.D.) gave an exhibition of gladiators, wild beasts, and sea fights which lasted 100 days, in which 10,000 men fought. Such contests were finally stopped in 404 A.D., it is said, as a result of the splendid daring of Telemachus, an Asiatic monk, who rushing into the arena strove to part two gladiators. The spectators stoned him to death, but the Emperor Honorius issued an edict suppressing such exhibitions.

GLADIO'LUS. Stately in form and rich in color, the gladiolus is one of the most effective of garden flowers. There are more than 160 species of this lilylike member of the Iris family (Iridaceae). Most of them are natives of South Africa. From them gardeners have produced many hundreds of varieties of all colors. The flowers grow in spikes at the top of a stem sometimes four or five feet tall. They are tubular, with six or more divisions (petals and petallike sepals). The plants may be raised from seed or from the corms. The name gladiolus is the diminutive of the Latin gladius, a "sword," from the shape of the leaves. Sword lily is another name for the flower. In the United States, Florida leads in growing gladioli for northern winter markets.

GLADSTONE, WILLIAM EWART (1809–1898). On his graduation from Oxford in 1831 young William Gladstone wanted to become a clergyman in the Church of England. But his strong-willed father, Sir John, directed that he enter politics. For 60 years William Gladstone served the government almost continuously, achieving one of the most brilliant state careers in British history. Four times during the reign of Queen Victoria he was prime minister.

Gladstone was born in Liverpool, Dec. 29, 1809. His father was a wealthy merchant of Scottish descent, and had rich plantations in the West Indies. Young Gladstone went to Eton and Oxford. He enjoyed sports, but became noted as a student and debater. He was graduated from Oxford with first honors in classics and mathematics, a rare "double first."

At the age of 24 Gladstone entered the House of Commons as a Conservative. He was a striking speaker. His powerful yet musical voice commanded attention. Many of his speeches resounded with classical phrases, yet he had a gift for "swaying the masses."

For the most part they were prisoners taken in war, slaves, or the worst classes of criminals. When a gladiator was disabled or disarmed, if the spectators

Two relatively minor posts gave him invaluable experience. In 1835, he became undersecretary for the colonies. His tireless investigation of colonial problems convinced him that colonies should have local

## LAST FIGHT OF THE GLADIATORS



It was in A.D (6) during the feder of the Emperic Rossons that the therling sent took place. The platitude will be sent and assessment of the sent through the

WILLIAM EWART GLADSTONE

self-government. This strain of liberalism appeared increasingly in Gladstone's thinking. In 1841 he became vice-president of the Board of Trade.

Two years later, as president of the Board, he entered the Cabinet, where he fought for free trade. His

financial knowledge enabled him in 1852 to reveal the flaws in the budget presented by Benjamin Disraeli, chancellor of the exchequer. The rivalry between these two men lasted for 30 years.

In the sixties the more liberal Whigs—or Liberals, as they came to be called-received additions from the free-trade Conservatives (the followers of Robert Peel). Gladstone, originally a Conservative, was among those who moved toward Liberalism. The Liberals' power increased when the electorate was broadened in 1867 to include workingmen in towns. Gladstone soon obtained complete ascendancy in the party.

Gladstone helped to bring about most of the great social and political reforms of the late 19th century. He was responsible for the

first state aid to public elementary schools, for opening Oxford and Cambridge universities to men of all religions, and for introducing the sceret ballot. Most of all, he is remembered for his Irish reforms.

Ireland's age-old misery and discontent were best solved, Gladstone believed, by admitting and correcting the wrongs done by England. Although most of the people in Ireland were Catholics, they were forced to pay tithes to the established Protestant ehureh of Ireland. Gladstone led in passing an act disestablishing the Irish Protestant Church in 1869. He was also responsible for the first Irish Land Act (1870), which protected landless farmers against eviction and helped them buy their farms from the absentee landlords. Finally, he introduced the first Irish Home Rule Bill. It was this bill (1886) that split the Liberal party. Gladstone was deserted by many Liberals. His bill was defeated, and he himself was forced to resign as prime minister. When he returned to that post a few years later, he brought in his second Home Rule Bill (1893). It was passed in the House of Commons this time but failed in the House of Lords. His effort was important, nevertheless, as a first step toward both Irish independence and the limitation of the Lords' veto power.

Gladstone explained his change from Tory to extreme Liberal thus: "I was brought up to distrust and dislike liberty: I learned to believe in it." In his 85th year (1894), approaching blindness forced him to retire from public life. He died at his home in Hawarden Castle, Wales, in 1898. He had served as prime minister from 1868 to 1874; from 1880 to 1885; from February to July, 1886; and from 1892 to 1894.

organs called glands. They take materials from the blood and lymph and use them to make special chemical eompounds. The salivary glands, liver, and pancreas, as well as millions of tiny glands in the walls of

GLAND. In various parts of the body there are



Statesman, scholar, and orator, Gladstone was known as the "grand old man" of British politics.

the stomach and intestines, manufacture substances that take part in digestion (see Digestion; Liver). Lacrimal glands provide a salty liquid to keep the eyes clean and moist. Sweat glands supply the skin with moisture that eools the body as it evaporates. These glands all have outlets, or ducts. The glands' products pass through the ducts to the digestive tract or to the surface of the body. Glands of another kind have no outlets. Instead, blood collects their products through the walls of capillaries and carries them to other parts of the body. Such glands are ealled ductless or endocrine glands. Their products are hormones (see Hormones).

GLASGOW, SCOTLAND. Glasgow is the largest city in Scotland. It is the center of a great indus-

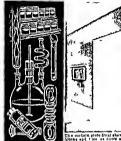
trial area, and it is also Scotland's ehief port in the west. It lies on both banks of the River Clyde, 21 miles inland from its estuary, the Firth of Clyde. Some of the biggest ships affoat have been built on this river.

In the early 18th century the Clyde at Glasgow was only two feet deep at low tide. After Scotland's union with England, the people of Glasgow determined to have a port so that they could share in England's profitable trade with America. In 1773 they began to narrow the river channel, forcing the river to dig its bottom deeper. Dredging has continued to the present time. Today great ocean liners can go into the heart of the city.

Glasgow's shipbuilding and other great engineering works were based on the coal and iron in the county (Lanarkshire). The iron ore is now exhausted, and the coal is also approaching an end. Glasgow's greatest days are probably past. The city now produces ships, locomotives, bridges, machinery, and textiles, and it is developing a wide variety of light industries. It also has a large tourist business because it is the starting point for trips to the western Highlands and some of the finest scenery in the British Isles.

Glasgow is a modern city with wide, straight streets and miles and miles of workers' houses. None of the buildings is of historic interest except the cathedral in early Gothic style, which was reconstructed in the 13th century. The University of Glasgow, founded in 1451, was rebuilt in the 19th century and all its buildings are modern. The municipal art gallery contains a fine collection of paintings. Population (1951 census, preliminary), 1,089,555.

# GLASS for PRACTICAL and DECORATIVE USES







I ASS Our greatest benefit from glass is that it lets in light while shutting out air Glass windo spanes admit daylight to our homes but keep out cold or stormy weather Glass bulbs transm t electro I ght but keep out air that would consume the hot filament Glass jars and bottles show us what is inside them Glass mirrors reflect light and optical glass in lenses focuses light for more accurate vis on

Glave serves in countless other ways. In our homes we use glass cooking and tableware and all sorts of glass ornaments. Homes and industries use one kind of glass for thermal (heat and cold) insulat on and an other kind for electrical insulation. Laboratories have

glass beakers flasks acid containers and tubing Sev eral kinds of glass vacuum tubes are used in electronics Glass fibers are woven into many useful fabrics. Foam glass made of countless tiny glass bubbles has many applications

Why Is Glass So Useful?

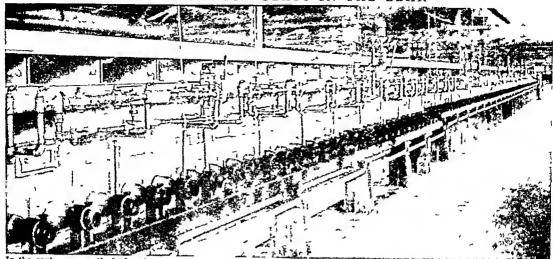
One reason for the wadespread use of glass is that most glass products can be made cheaply. The raw materials of glass-sand sods or potash and limeare abundant and easily obtained Mass-production metho is turn them into products such as bottles or bulbs at a very low cost for each unit Furthermore many different kinds of glass can be made to suit par ticular purposes Ant

molten glass is easily worked It can be rolled molded blown or drawn into countless sizes and shapes

Glass as extremely dur able Window glass can withstand weather for centuries Glass does not retain odors and can be completely stenlized It is nonnorous and a sealed bulb or bottle can he made a rtight Acids (except hydrofluoric acid) do not affect most kinds of glass Therefore glass is widely used to hold acids and as a pot or liner to hold chemicals in reactions



#### COOLING HOT GLASS IN THE LEHR



te continuous method of making sneet glass, a long ribbon of through a long lehr, or annealing oven, shown in this picture. f molten glass is drawn from a tank. Then it travels on rollen The lehr cools the glass slowly and thereby reduces strain.

Window glass and most glass bottles are brittle and easily broken, but certain glasses have amazing strength. Glass brick and glass tile support heavy loads in buildings Tempered plate glass is used for store counters, table tops, and doors Heat-tempered glass does not melt under high temperatures and withstands the shock of sudden cooling Safety glass splinters under a heavy blow, but does not scatter as dangerous fragments A glass fiber is stronger than silk of equal thickness.

Good glass has an almost gemlike brilliance, and in the hands of an expert craftsman it can take graceful and beautiful shapes. Antique glassware is highly prized, but many products of modern workmanship can equal or surpass it in beauty. Leading artists

now make designs for glass tableware and for decorative bowls, vascs, and plates.

### Ingredients from the Earth

The most important ingredient for glassmaking is silica, in the form of sand. Not all sand is suitable If the sand has more than a trace of iron, the iron will make the glass dark green in color. Even for ordinary window glass, sand must be over 99 per cent pure silica, perfectly white and not too fine. Mo-t of the sand used in American glass manufacturing comes from deposits along New Jersey river banks and from sandstone or sand beds in Pennsylvania, West Virginia, Illinois, and Missouri.

Silica alone can melt and run together to form glass but extremely high temperatures are needed. The

melting temperature can be reduced by adding an alkali such as soda ash (sodium carbonate) or potash (hydrated potassium chloride) Salt cake (sodium sulphate) is often added to prevent an undissolved floating scum of silica.

Glass made of silica and soda ash or potash alone is called water glass It dissolves in water, and the solution can be used as a fireproofing or preserving agent or as a glue. But glass for most purposes must be rigid and durable Adding a stabilizing ingredient to the mixture or batch makes the glass hard and long-wearing.





ing glass of special types and thicknesses, the raw materials are melted in large clay re a workman nees a pincerlike crane to withdraw a pot from the gas-fired pot furnace From the furnace the molten glass will be carried to casting tables or molds

Lime in the form of limestone (calcum earbonate) or burnt lime is most often used Other stabilizing in gred ents for the batch may be magnesum barium z ne aluminum lead or buron compounds

The whole melting process is helped by adding a large quantity of scrap or broken plass crushed to a fine powder called cullet From 25 to 75 per cent of the whole mixture may be cullet Glassmakers ords nanly use only cullet of glass they have made to be sure that they know all the ingredients in it

Other chemicals aid the melting process or remove impurities which might dis color the glass When a color 19 desired various metall c compounds may be added Cupne (copper) ov de or cobalt oxide gives a blue glass Green is obtained from chromium or iron compounds Red comes from selenium cuprous ox ide or gold

Mixing and Metrine

### the Batch

The separate agredients for a batch of glass are thoroughly mixed in rotating devices that resemble cement mixers Then the batch is carried to the fur nace for melting

Two types of furnares are

used the pot furnace and the tank furnace. In the pot furnace the batch is poured into separate clay pots One furnace may hold up to 20 pots. The pots are usually of one ton capacity and may be open or covered

The furnace itself is heated by oil or natural gas and the furnace interior may reach a temperature of more than 3 000° F These high temperatures are achieved by preheating the ar used in burning the gas or oil Heat for this process comes from the spent flame gases which have already done the r work in heating the furnace The walls of the tank furnace actually serve as a container for the melt These are I ned with special fire-clay bricks which resist the heat of the molten glass

DRAWING GLASS BY THE FOURCAULT PROCESS

ded feute or drawing bluck One sel and fixed sal of to a turos w b lhe men cul lhe sheet into dee ed tengths

> In the tank furnace the flame comes in direct con tact with the glass Small glass factories use a do, tank which melts a fe , tons of glass ready for work ng the next day Larger factories use a continuous tank Raw materials constantly flow in at one end and mol ten glass is withdrawn at the other

> Making Sheet and Plate Glass One of the main uses of the continuous tank is to provide molten glass for making long sheets. These are later cut to size for win lovs and similar uses

In the Colburn process, manufacture begins when a worker dips a tool, called a bait, into the tank. As he lifts the bait, molten glass rises with it, clinging like a sheet of hot taffy. He leads the sheet across bending rolls and starts it on its way Thereafter

the sheet is drawn ribbonlike from the tank by rollers. It passes between flattening rolls and through an annealing lehr, or oven. In the lehr, the glass is slowly cooled, or annealed, under controlled temperatures. The cooling removes internal stresses from the glass structure

In the Fourcault process, shown in the

picture on the previous page. a debiteuse or clay block floats on the surface of the molten glass. A workman starts the glass rising through a slot in the debiteuse with a bait, and it continues up through flattening rolls. Controlled temperatures annual the glass as it rises. At the breakoff floor, workmen called breakers cut the glass to desired sizes.

Plate glass is usually thicker than window glass and offers less distortion to vision. Some of it is still made by the old table-casting process. Here molten glass is poured from a pot onto an iron easting table, rolled into uniform thickness, then carried to an annealing oven.

The continuous-pour process for making plate glass somewhat resembles sheet-glass manufacturing meth-

ods. Molten glass pours over a lip at the edge of the tank and then passes as a shallow stream through rollers. It continues directly through the annealing lehr.

Plate glass made either by casting or pouring must be ground and polished. When the plate is cooled, it is set in plaster of Paris, then ground by giant disks

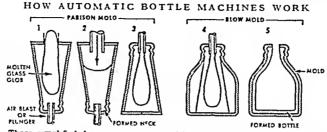
plaster of Paris, then ground by giant disks using sand, emery, and water as an abrasive. This process removes the larger surface flaws and brings the glass down to the desired thickness. Then felt-surfaced polishing disks apply a high gloss to the plate with jeweler's rouge (iron oxide) and water.

Sometimes the glass is not polished but given a separate surface treatment that makes it translucent (that is, it transmits light) but not transparent (nothing can be seen through it). (Why glass has varying properties such as different degrees of transpa-

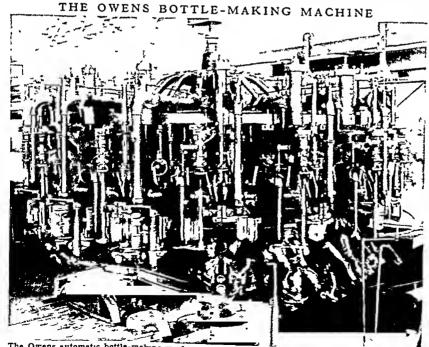
reney is not yet known.
Glassmakers still achieve
many desired results by
using methods which experience has proved will
work.)

Tempered plate glass is given special heat treatment that makes it several times as strong as ordinary plate glass. It is immune to sudden heating and cooling. Safetu glass is made by combining two pieces of plate or sheet glass with a layer of transparent plastic between them When the glass is broken by a blow, the plastic keeps the fragments from scattering.

For large windows manufacturers use two panes, set a fraction of an inch apart. They seal alledges, creating a deadair space between the panes. This forms an excellent insulation,



These simplified drawings summarize different methods of making glass hottles 1. A gloh of molten glass drops into the preparatory (parison) mold 2. The gloh is pressed toward the bottom, forming the neck. 3. The mold is inverted, and an air blast or plunger forces the hot glass to fill all sides of the mold 4. The partially formed bottle is transferred to the final (blow) mold 5. Another air blast forces the glass against the sides of the mold, giving the hottle its final shape.



The Owens automatic bottle-making machine uses some of the principles shown in the drawings above. As the machine revolves, each mold mechanism passes the tank and sicks in a glob of molten glass to begin work. The machine produces hundreds of bottles a minnte.

and the inner pane does not frost over in cold weather Glass from pots or tanks is also cast or molded into architectural glass with deep surface patterns and hollow air tight building blocks

### Optical Glass

Optical glass for spectacles microscopes telescopes and other spec alized uses is prepared more carefully then any other class There are two general types Crown glass has low refraction and low dispersion Flint close has high refraction and high dispersion (Fyplanations of the terms re fraction and dispersion are given in the article on Lens ) Each type has varieties made from hundreds of different batch com-

positions For high-quality lenses the batch is melted in clay pots and

allowed to cool In cooling the glass breaks up into rough fragments. These are inspected for defects Selected pieces are reheated to softening temperatures and shaped into lens blanks by hand tools or in a mold Glass for lower-quality lenses is poured from the pot onto a rasting table then rolled flat After

annealing the sheet is cut up into blanks Pouring glase for the 200 inch reflector of Mount Palomar Observatory in 1934 was one of the most painstaking tasks in glassmaking history. At the bottom of the mold were ceramic blocks to form pockets and ribs in the glass. These reduced we ght and made places for attaching fastening devices On the first pourng some of the blocks came loose and rose to the surface spoiling the operation. The second pour ing was successful The 20 ton cast ng was allowed to cool only a degree or two a day for ten months



Grand ng and polishing proceeded with equal care

(See also Observatory )

Molding and Blowing by Machine

Manufacturing glass bottles pars tumblers and similar items employs highly involved mechanical processes But the methods can be understood gener ally by studying the diagram on the previous page Notice that the parison mold receives malten plans and starts the shaping process especially the neck and the blose mold gives the glass its final form

The main difference between various bottle-mak ng ma hines is the method by which the glass enters the mold In the suction-feed type the parison molds suck up the glass from a shallow tank In the gob feeder glass flows from the tank into a trough At. the lower end of the trough is an orifice. The glass drops through the orifice and mechanical shears cut.

HISTNG GLASS



off the exact quantity needed to fill the parison.

In making electric light bulbs, a ribbon of hot glass leaves the tank and flows between rollers. One roller has a circular depression that leaves its mark at regular intervals along the ribbon. The ribbon moves to a flat conveyer belt with holes into which the depressed portions of the ribbon fit. Molds rise around the depressions and compressed air nozzles drop down over them. The nozzles puff the depressions into partial shape; and a second set of nozzles and molds finish the operation. After annealing, the inside of the bulbs are frosted by spraying with a solution containing hydrofluorie acid.

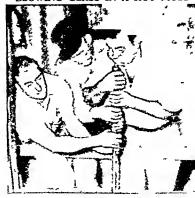
Bottle and bulb machines work tremendously fast, producing many hundred units a minute. Other molded ware is produced more slowly. Another important product of molding processes is borosilicate glassware, made from a mixture of about 80 per eent silica, about 10 per cent borie oxide, and some alumina. The glass is extremely heat resistant and finds wide use for cooking utensils and laboratory glassware. One of its trade names is Pyrey.

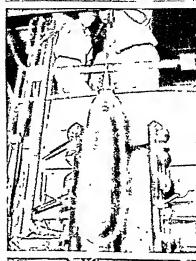
# Glass Fibers and Foam Glass

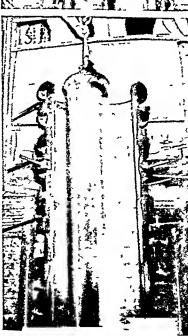
A great variety of products is fashioned from fibers made of glass. The fiber itself may be only one fifteenth the diameter of a human hair, but it is actually a solid rod of glass. As such it has the qualities of glass. It does not burn or absorb moisture; it resists weathering, acids, and corrosion; and it is a good electrical insulator.

Glass for fibers is first formed into glass marbles. These are inspected for flaws, then remelted in a furnace. One method makes a staple fiber out of the molten glass. The glass flows through tiny orifices, and as it emerges jets of air or steam whip it into six- to twelve-inch lengths. Another method makes a continuous filament by pushing the glass through orifices, then twisting the fibers into a strand as they come out of the holes.

BLOWING GLASS IN A HOT MOLD







The long-staple fibers look like cotton or mohair; the filaments resemble silk or rayon. After being coated, or bonded, with a starelilike compound, they can be handled by standard textile machinery (see Fabries; Textiles). Coarser fibers are interlaced to form glass uool, or are matted down and held together with a plastie for use as a mat or straining filter.

Foam glass is made by heating a mixture of ground glass and finely divided carbon in a mold The mixture rises like a cake and fills the mold. When cooled and taken from the mold, the "cake" is a mass of sealed glass bubbles, rigid but extremely light and buoyant. It thus resembles eork in many ways, and is even better than eark for a variety of uses. It goes into life preservers and rafts and is used for thermal insulation in refrigerators, building walls, and roofs.

Working Glass by Hand

Automatie glass maehines turn out many useful and even beautiful products. But machines can make only items of fairly simple design. These must be in wide demand in order to justify the eost of expensive equipment. To make products of intricate design or for special or limited use. eraftsmen employ tools and methods that have changed little in centuries.

Blowing glass by the offhand method, without using molds of any kind, is a very old art. The process begins as a workman. called a gatherer, dips a blowpipe into glass somewhat cooler than the highest temperature reached in melting. The blowpipe is four or five feet long with a mouthpiece at one end and a gathering head at the other. The gatherer pulls up a mass of hot glass called a gather, and turns the pipe until the gather becomes globular. Sometimes he rolls the

These pictures show steps in blowing a large hlueprint cylinder. The gaffer (top) blows the molten glass into preliming shape. Then the hubble is enclosed in a red-hot irou mold. Further blowing it to final shape. The mold opens and the cylinder is removed for annealing

gather on a marrer (an iron slab) or on a hollowed out wet wooden block Then he blows a small bubble into the place and hands the pipe to the blower or gaffer

The blower com pletes the work He blows the inside of the piece into final shape and with a few sim ple tools fashions the outsi le form and puts on the stem han lle or other ad btions If the glass cools too rapidly he reheats it at the glory hole a small furnace

### Hand Shaping For certain circu

lar a roducta such as goo i qual ty tumbiers the flo ver places the gather into a paste mold. This mold is constructed of hanged halves and is I ne I with a gummy paste. He wets the moli before using and the contact of hot glass

with water forms a layer of steam that keeps the glass from sticking. The blower puffs into the glass and the air inside the mold slapes the piece For shapes other than eir u lar the blower may use an area

or hot mold This is a hinged cast iron mold heated red hot before using Fine glass table ware is often made in hand operated press nold: The gith erer uses a p ntu a long tron mid instead of a blowp pe to fill the mol ! The mold worker called the presser works a lever Operated plunger that shapes the glass

### The Age Old History of Glassmaking

No one knows when or where men first made glass Pluny the Elder a Roman writer suggested that Phaenician sailors landed for the might on a sandy beach in Palestine and used blocks of natron a crude form of sods to make a temporary fireplace In

the schee next morning they found lumps of glass formed by the beach sand and the soda But modern research has traced glass far before the date Pi ny set Archeologists have found glass in Egypt that may

have been made before 3400 me. The oldest defin tely dated piece in an Oxford England, muscum is a ball



th in young system can stand : one of mo ten glass condy for

bead bearing the cartouche of Amenhoten I an Egypt an who re gned from 1545 to 1525 Br Glass beads found in excasat one of the Third Dynasty of Ur (2150 s c ) and cate that manufacture may have started in Mesoputamia or even further north

Tie Phoenicians may have invente I glass blo sing and the Egyptians brought it to a fine art. They also molded articles of great beauty

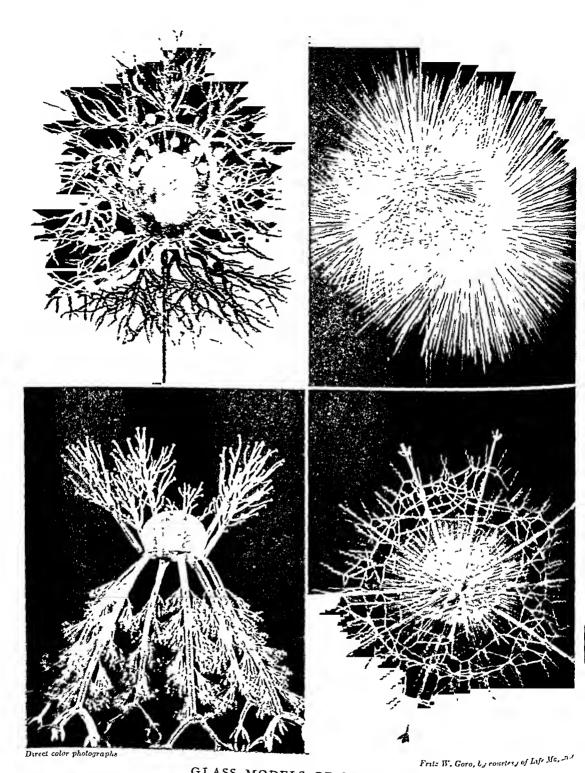
They laid gorgeous mosaics of glass and pro luced a glass color Nile blue which has remained unrivaled The Athen ans docorated floors eculings and a dewalks with colored opaque glass The Romans made the first win d we These were small panes a half-nch thick used in the hix unous Pompeian baths Spanish glass dates from the time of Cirst with notable contribu tions in glass chandeliers and engraved glass



### Venice s Contribution to the Are

Ven ce provided the 1 nk between the ancent and modern gitesmaking arts Venetians knew glassmaking secrets from Roman times and in the early Renaissance were producing

beautiful molded and spun glassware. In 1268 the Venetian workers were incorporated and 23 years later. they were segregated on the near by Island of Murano partly because their furnaces were fire hazards but mainly to keep the secrets of the trade. The death penalty was decreed for workers who left 'lurano



GLASS MODELS OF SEA LIFE

The painstaking and delicate skill of the glass blower can be appreciated in these intricate models of radiolaria, minute one-celled animals that float near the surface of warm seas. They were made by Herman Mueller for the American Museum of Natural History under the direction of Dr. Roy Waldo Miner.

Venetian glass was extremely light in weight, and when partially softened by heat, it could be fashuned into the most delease pieces. It had sparking clarity unequaled until the 10th century Glass was one of Venue's cluff exports, known throughout Europe and Asia Venetians also made time class warries.

### Stained Glass

The first mention of staned glass windows is in the writings of 4th- and 5th-century. Latin and Greek authors: By the 12th century putcond deagos had been introduced. At first the glass was dyed during, including by adding metallic oxides: Later, enamel ass applied to the surface and fueed on Etching toned down this stample along to obscatching.

Designs were made by fitting this of the mosses mile strips of less folied over the edges. The strips also served to outline the design Medillons for the larger windows required by Gobine architecture were side into an iron framework which also enhanced the design. But even ordinary windows were restricted to this ordinary windows were restricted in the strip of the strip of the strip of the strip in the strip of the strip of the strip of the strip in their houses.

### Glassmaking in America

The first manufacturing in America was the glass plant at the short-lived Jamestown colony Thereofier colonial Americans made sporador attempts to set up fivemaking industries but none was no cessful until Cappar Wistor, a Philadelphia brase-button manufacturer, entered the glass business in 1739. He brought beginn experts and shared the profits with them in

return for glassmaking secrets Wistar concentrated on window glass

and ware for everyday use The first American to make fine glassware was Henry William Stiegel a colonial ironmaster of Manheim, Pa His craftsmen fashioned beautiful fint-glass tableware and ornaments in a variety of colors They executed deltcate engravings, etchings, and enamelings to decorate the glass Stregel's products are highly prized by collectors and museums The only colonial glass



The stained gives windows at the Chartree Cathadral Prance are as precious as gone Most of them were gift of King Louis IX. This use about St. Eustace hoptor The colors are brawn and cream, in a barder of ce

Glassmaking Becomes
a Giant Industry
In 1828 Demning Jaro

In 1828 Deming Jarves patented an unproved press mold, described in a previous section of this article The device made possible the mass production of many glass stems Skilled craftsmen hoarding ancient secrets. were not needed, ordinary workers could handle the molds Jarves founded the Boston and Sandwich Gloss Company and made fine products which are collector's stems today By the myddle of the 19th

century Pittsburgh was a century Pittsburgh was a century British and the century Pittsburgh was a second century Pittsburgh was a second century Pittsburgh was a century

mond Labbey and John B. Ford pioneered in new industrial developments. Ford was the first to use natural gas for tank furnaces. In 1904 Michael J. Owens invented bottle-making machinery and rose to great achievements in the glass industry. Until the 1900's all window glass was made by

fixtening hand-blown glass bubbles or, later, handblown sylinders in 1993 H Lubbers invented a method of mediane-blowing the cylinders using tran of glass made in tank furnace. About the same time Irving W Colburn began experiments with containquest-blown behavior. His process began producing nucest-blown behavior. His process began producing techniques Craile Fourcault, a Belgaan, made similar experiments and perfected the vertical sheet method, shown in the picture on a previous page. His process was introduced in the United States in 1923.

EXAMPLES OF MODERN ART GLASS





The work of modern article is given mustaken the must be suited a reduct of accident times the requirement of the contract of the contract of the contract of the contract times the requirement of the contract of the cont

GOAT. No domestic animal has been of more use to man than the goat. It gives meat and milk. Fine leather is made from its hide. A strong cloth and soft wool are made from its hair. It is an amusing and affectionate pet, and in some places it is used as a beast of burden.

Goats are closely related to sheep. Like sheep, they are ruminants and eat grasses and shrubs (see Ruminants). They can live on coar-c, thin growth, and people can raise them on land that is too poor to

support cattle or sheep.

Goats are distinguished from sheep by the long beard on the chin of all males and most females. The tail is shorter than a sheep's and turns upward. The norns grow upward from the head, a sheep's horns twist to the sides of the head. Most goats are somewhat smaller than sheep. A full-grown domestic animal weighs 100 to 120 pounds. The hair is straight, but some kinds have a woolly undercoat.

The goat is often misunderstood and ridiculed. Its reputation for evil may come from the occasionally

strong odor of the males. A clean animal has little odor except at the breeding season, and the females have none. Goats do not eat trash. If they are sufficiently hungry they may lick labels off tin cans to obtain the glue on the backs.

Breeders of goats prefer to call the males and females "bucks" and "does," instead of the popular "billy" and "nanny." The young is known as a "kid" until it is a year old. The domestic doe carries her unborn young for 21 to 22 weeks. One to three kids are born at a time. They can follow the mother about and even climb mountainsides a few hours after birth. They mature at six months,

but domestic animals are not usually bred before 18 months. Goats may live to be about 15 years of age.

Wild goats are found only in Furgue, northern

Wild goats are found only in Europe, northern Africa, and Asia. There are ten species, including the ibe\ (see Ibe\). The Rocky Mountain goat of North America is not a goat but an antelope (see Antelope)

Domesticated goats (Capra hircus) are thought to be descended from the wild goat of Persia. Goats are often mentioned in the Bible and in the religious writings of Buddha, Confueius, and Zoroaster. Captain John Smith was among the first to introduce them into America.

### Goats Raised for Milk

Goats cost little to feed in comparison with other domestic animals and require little space. Therefore they are often called "the poor man's cow." Different breeds are raised for milk, wool, and leather. The most popular milk breeds are the Toggenburg and Saanen from Switzerland, and the Nubian, from Exprand Ethiopia. These are usually hornless, although horns occasionally occur.

The Toggenburg is brown or chocolate-colored, with a light stripe down each side of the face. The kg are light gray or white. The Saanen is pure white The Nubian is black, dark brown, or tan, with or with-

out white markings. It is larger than the Swiss breeds, with shorter, finer hair. It has long lop ears, and a prominent forehead and nose give it a peculiar "Roman" profile. It is not so hardy as the Swiss breeds and cannot stand severe cold.

Goats average four to six and a half pounds of milk a day for teamonths of the year. The milk differ from cow's milk in the smaller six of the fat globules and in the softer curd. Thus it is easy to digest and therefore helpful for some infant and invalids. It is also free from tuberculosis germs. The cream is naturally homogenized; that is, it never separates thoroughly as it does

in the case of cow's milk nor can it be skimmed off. It can, however, be separated mechanically.

If the milk is handled properly it has no unpleasant odor or flavor. Bucks should not be permitted to run



A LIVELY LITTLE KID

This playful and affectionate little goat of the Saanen milk breed makes a loveable pet. It is called a kid until it is a year old.

# TWO USEFUL MEMBERS OF THE GOAT FAMILY



The Angora goat (left) has heavy fleece, which is made into the fabric called mohair. This goat lives in brush and desert country the following the state. Notice the drooping ears and long, flat-twisted horns. At the right is a Toggenburg back. The buck has a brushy, upright tail and short pointed ears.

with the does because the milk may absorb their odor. Butter and cheese can be made from goat's milk but the production in the United States is not large.

Goats Raised for Wool

Angon and Cashmere goats are the chet wood producers. The Angora goat naive to Angora an Assa Umor, has a history that may be traced lack to the days of Abraham. This type has long sparth horns and an abundance of long white silky horr from which a strong cloth is made celled mohur. It is extensively bred in Turkey, South Africa, and southwesters to great of the total clip. The Williamette Valley in Orgon also has large hords. Burshwood forms one of its favorite strides of did that and so beated Augoras are mutth, used for clearing brushlimd. The flesh of this society is chibble at all ages. It is similar to minton

Kashmr (India) and Thet are the home of the Cashnare geat from whose beautifull, soft silky undercoattre made the Jamous Cashmere shawls. Attempts to introduce this breed in the United Nates have beunsuccessful. Cashmere shawls are executingly cestly for a taken the finese of tem grant or the company of the for a taken the finese of tem grant was to see the proton taken the finese of tem grant was to see the proton taken the grant of the proton that the properties of the proton that the proton the proton that the proton the proton that the proton that the proton that the proton the proton that the proton the

The lutes of Iods and port as much as used extensively for gloves and shoes; shough much of law and the law and la

large sources

(GOTTHALS (GOTHAL) GENERAL GEORGE WASHINGTON (1855-1928) Building the Panama Canla was not of man a greatest victories over nature. The man who led the construction of this mammoth project was 100 (later Val.) Gen) (George Val. hangton George Val. (Later Val.) Gen) (George Val. hangton George Val.) Gen (George Val.) George Val. (Later Val.) Gen (George Val.) George (George Va

Goethals was born June 29 1888 in Brooklyn N Y
As a youth he was big quet and sole moving, less
intere-led in play than in planning he future By
working after school he put himself through three
years of study at the College of the City of New York
Then he heard of an open appointment to West June
Le passed the examination and entered in 1876

are passed the examination and entered it does not seem that and those to serve in the Corp, of Engineers Four years later he married Effic Rodman, they had tao sons Until 1907 Goethals combined practical field experience with terms of teaching at Viest Point and desk work in

Washington, D. C. He built dams, bridges, levees, and locks on such important rivers as the Ohio, the Tennessee and the Cumberland Goethals became known both as an expert engineer and an inspiring leader of menoren Gen. G. w. GOETHALS. When President Theo-



when resource theodore Roosevelt appointed him to his great task Goethals was prepared He faced a job that two previous chief engineers had given up. But by driving himself and his men the canal was completed a year ahead of schedule Goethals divided by

tune between his office and places where actual digging and buildings and building and the parameters are that and trad tracks, his men mediananch it the con 'On Sunday mornings he held information."

ran on railroad treeks, his men meknamed it 'the brain wagon' On Sunday mornings he held informal court sessions listening to compliants and settling disputes. All workers no matter what their station could be sue of a fair hearing and vertice. The Panema Canal opened for traffic in 1914. Goe-

The Panama Canal opened for traffic in 1914 Gothals remained in Panama as governor of the Canal Zone for two more years. During the first World Weihe served as quartermaster general, then retured from the Army Tor the remainder of his life he acted as consulting engineer on important projects, including the Port of New York. He due Jan 21, 1929.

GOETHE (4"20), JORANN WOLFGAMG VON (1749-1832) In the ranks of German authors Goether name stands first. His place is comparable to Shake speares in English literature. Goether's own character and personality is seen everywhere in his writings, and the world finds Goethe the man even more fase; nating than the people in his stories and pocess

Osche was born in Frankfort-on the-Main Germany on Ang 28 1749. His father belain Kaspar Goethe was alwayer and state counciler limited the land only 18 when Goethe was born. She once said "My Wolf and I were clul lent together and "My Wolf and I were clul lent together may be the said of the was born. She open said "My Wolf and I were clul lent together may be the said of the week of the was born. She open said that the said is not said that the said is not said that the period traits helped him find the "golden mean" in his life and in law shring the golden mean in law shring the "golden mean" in his life and in law shring the golden mean in law shring the golden mean

The boy grew up in a time of great political change. The Seven Year, "We n (170-54) established Prussian power and shock the whole of Europe. It came to to the Goothes when the French judge advocate general was quartered in their house for a time. But for the most part he had a happy childhood. Associated Goethe and private tutors taught. Worlgang and his seter at home. The boy was a good student of hterature. He wrote his first plays for a small puppet theater, and from his grandmother. When he was 16 he entered the University of Leipzig as a law student. He completed his studies at the University of Strasbourg and was awarded a doctor of laws degree in 1771. There the critic Herder introduced him to old German folk tales and to the best of English literature in German translation.

Goethe returned to Frankfort to practise law, but turned to writing almost at once. In 1773 his drama 'Goetz von Berlichingen' was published; the following year he wrote 'The Sorrows of Werther'. Both works were strongly influenced by the Sturm und Drang (Storm and Stress) literary movement that was sweeping Germany (see German Literature). 'Werther' made Goethe known throughout Europe.

In 1775 Goethe met Karl August, Duke of Saxe-Weimar. The duke wanted a man to restore order in his state affairs. He knew young Goethe could install new and effieient methods. Goethe became his minister of state; and for the next 11 years the writer devoted himself

to practical problems. He became expert in taxation, industrial problems, farming, and mining.

During this time, Goethe wrote little. He wanted to return to literature and asked the duke for a release. The duke refused; but Goethe left, nevertheless, for a two-year stay in Italy (1786-88). Goethe regarded his Italian journey as the most important period in his life. He realized the Sturm und Drang school had gone too far; and in the elassie art and architecture of Italy he found the order and restraint that guided his work from then on. He became conservative but never reactionary.

Goethe returned to Weimar to live, but served the duke only as an adviser. Later he became the director of the duke's court theater. Because of Goethe, Weimar became the intellectual center of Germany. Many great men came to live in the little town. Among them was the poet and dramatist Schiller. He and Goethe became intimate friends and helped each other in their writings. Goethe's fame spread over Europe and to the United States. After meeting him, Napoleon exclaimed, "Voilà un homme!" (There is a man!)

Goethe had many romantic attachments, but he did not marry until he was 57. His wife was Christiane Vulpius, a girl he met in Rome. She remained apart from Goethe's intellectual life, but he loved her for both her companionship and her cooking.

## Goethe's Greatest Work-'Faust'

Goethe once said that his poems made up a "great confession." In a sense the dramatic poem 'Faust' is a "confession" of his whole life. As a child, he learned the story from a puppet play; he wrote the last scene of his 'Faust' in old age. For most of his life he held the story in his mind, until at last it became an expression of his mature thought and philosophy.



This great German author created an enduring masterpiece in 'Faust'.

The story is simple, but its implications are profound. In Goethe's version, Faust desires all knowledge. Unsatisfied with the results of his studies, he turns to magic. He conjures up the devil in the shape of Mephistopheles and makes an agreement with him. If he can gratify Faust's every wish.

Faust's soul will belong to Mephistopheles. Faust learns that pleasures are not happiness. His wishes reach their highest point in a grand project that will benefit others. The moral height he has reached calls the powers of heaven to his aid. In response they wrest his soul from Mephistopheles' hold. (See also Faust Legends.)

'Faust' was completed in 1831. Goethe died at Weimar on March 22, 1832. His chief works, in addition to single pieces, were: 'Goetz von Berlichingen' (1773); 'Werthers Leiden' (Sorrows of Werther), 1774; 'Iphigenie auf Tauris' (1787); 'Egmont' (1788); 'Torquato Tasso' (1790); 'Reineke Fuchs' (Reynard the Fox), 1793; 'Wilhelm Meisters

Lehrjahre' (Wilhelm Meister's Apprenticeship), 1796; 'Hermann und Dorothea' (1797); 'Aus meinem Leben: Dichtung und Wahrheit' (Out of My Life: Fiction and Truth, autobiography), 1811, 1812, 1814, 1833; 'Faust', complete (1831).

GOGH (\$\overline{g}\partials k\$), Vincent van (1853-1890). "You paint like a madman," van Gogh was told. His critics were only partly right. Van Gogh's later years were marked by attacks of insanity, and he ended his life by suicide. However, his work was not that of a madman but a genius. Today the world acclaims this tragic Dutch painter as one of the greatest artists of all time.

Vincent van Gogh was born March 30, 1853, in Zundert, in the Netherlands. His father was a clergyman, and Vincent was the eldest of six children. His closest friend was his brother Theo. Both attended school in a near-by village. When Vincent was 16 his uncle got him a job as elerk with a large firm of art dealers. In their branch at the Hague he became an efficient worker. After four years he was transferred to London. Here he visited art museums and read many books. But an unhappy love affair upset him greatly. He became silent and withdrawn and acted queerly.

Hoping the change might help, his employers sent him to their Paris branch. He continued his reading especially in the Bible, and studied great paintings in the galleries. But his queer ways became more noticeable and he was dismissed. He worked for a year in an English school and in a Netherlands book store, then decided to become a minister.

In 1877 he began studying theology in an Amsterdam school. He was a poor scholar and he disagreed with his teachers on religious doctrines. He entered a missionary school in Brussels, then went out as a

field worker among the noor min ers of the Bormage district in Belgium There he preached gave nursing care and sacrificed h m self in every way. But after two years his appointment was with drawn and he was again cast loose

By 1880 van Gogh realized that his true vocation was art. Theonow earning a good salary gave him an allowance and continued at for the rest of Vancent's life. He s bearn to draw and punt in earn est. For five years he studied and worked in Brussels the Hague and Antwerp He spent several months with his fam ly at Etten and Nuenen In 1896 le went to · live with Theo in Paris

. Here he worked hard and met the leading artists. But he grew mere sangly nervous in Paris and after two years he moved to Arles, in the south of Franco He rented a little house and made a few friends among the towns

people He invited the painter Paul Gauguin to stay with him But they quarreled and in a fit of madness Vincent cut off his own left ear Kno ving now that



he was seriously ill. Vincent asked to be confined. He was placed in an asylum in Saint Rémy near Arles for a year The attacks grew more frequent and Then brought him to a doctor in Auvers a suburb of Paris Depressed by his illness and his dependence on Theo Vincent shot himself He died July 29 1890

Van Gorh made about 800 paintings and 900 drawings in all For his first several years he did little but draw and he became a master with neutral and neu and

ink His paintings show a steady evolution of style. During his Holland Belgium period (1880 85) he used somber earth tones as in his Potato Eaters In Paris (1886-88) he worked with the impress oni is and was fascinated by their use of bright pure colors At Arles (1888 89) he used these colors with brilliant results in

Sunflowers in a Vase and many other paintings At Saint Rémy (1889 90) his various studies of cypresses and other pictures show an even more daring technique

### GOLD-The Age-old MEASURE of WEALTH

GOLD Through the ages men have wante I gold for ornaments because of its beaut ful color and freedom from tarnish. The unceasing demand made it acceptable everywhere as money But it was the most costly of all known metals Even though depos

its are plentiful most of them Two PROSPECTORS PAN FOR GOLD do not yiel I enough gold to pay for the cost of extraction. This holds true for the goll which is dissolved in sea water

Until recent times the com bination of ligh deman l sa 1 limited supily made gold the most precious metal Today there is a greater demand for other metals such as platinum These metals are still more d fficult to obtain in quantity and they have become more prec ous than gold

The total world output of gold in the 450 years between 1492 and 1942 was shout 50 000 tons If it were cast into a cube at would measure less than 44 feet each way Approximately one-half is in national treasuries as gold bul hon or gold com Perhaps a

third has been used in the arts and crafts as ienelry and decoration. The remainder is not accounted for Influence of Gold on Civilization

The demand for gold has been a powerful force in h story Nations have waged war for it Men bave robled and killed for it The

very nord goll has come to mean wealth which leads n en to destroy themselves

The search for gol | also | as helned to spread civilization Men have willingly enterel deserts and willerne ses to find it In the 15th century the Spaniards invaded Mexico and South America in search of gold In return they left the culture of the Old Worl I

The gold rush of 1849 brought great hordes of gold stekers to California Many stayed and helped settle the territory Il a discovery of golf in 1851 started the mass colonization of Australia D & coveries of gold in Alaska and South Afrea helpel greatly in the development of these countries



Most of the gold mined before 1500 was found in the Spanish peninsula, Greece, Asia Minor, India, and the Ural Mountains of Russia. After the discovery of America, great supplies were obtained from Central and South America. But the total production from that time to the discovery of the California gold fields was less than one year's output today. The discovery of the California deposits (1848) and other great fields resulted in an enormous jump in production. The most important of these other discoveries were Australia (1851), British Columbia (1858), New Zealand (1861), British India (1884), Witwatersrand, South Africa (1886), and Alaska (1897).

Today from one-third to one-half of the annual world output is mined in South Africa. Russia ranks second in annual world production. Canada is in third place, and the United States (including Alaska) is fourth. Most of the Canadian output comes from Ontario. In the United States, California, Utah, South Dakota, and Colorado are the principal sources. Australia, Mexico, the Belgian Congo, Korca, Colombia, India, and Nicaragua are other important producers.

Methods of Mining Gold

Mining methods vary according to the nature of the deposit. Gold-bearing sand can be worked by placer mining. Veins in solid rock can be worked by lode or quartz mining.

Placer mining is simple, because nature has done most of the work. Age-long erosion of gold-bearing rock has scattered particles of the metal along stream beds. The particles vary from fine powder (gold dust) to the great Australian nugget called "Welcome Stranger." It weighed 2,520 ounces—as much as a medium-sized man.

Men separate gold from gravel or sand by washing the deposit in a swirl of water. The water carries away the gravel or sand, but the gold sinks to the bot-

WORKING IN THE GOLD RUSH OF 1849



Prospectors of the California gold rush of 1849 are shoveling gold-hearing gravel into sluices Riffles catch the gold while the gravel is washed away.

tom because it is extraordinately heavy—19.3 times as dense as water. Washing may be done in a prospector's pan or in sluices. These are inclined troughs having riffles (bars or blocks) along the bottom to hold the gold.

Large deposits may be worked by hydraulic mining Powerful streams of water wash the gravel into the sluices. In gold dredging, an endless chain of bucketis used to move the deposit. Mercury may be used to enrich the yield. It forms an amalgam with the gold. Then the gold is freed by heating the amalgam until the mercury vaporizes.

Placer mining was known in ancient times. Pictorial rock carvings in Egypt show gold washing as early as 4000 B.C. The Greek legend of the Golden Fleece may have been suggested by the use of fleeces to catch gold in ditches and flumes (inclined channels)

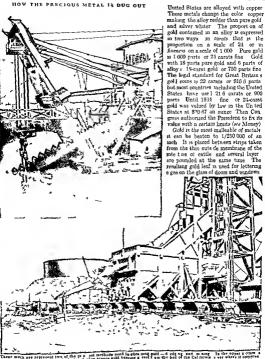
Methods of Lode Mining

The known placer deposits are now largely exhausted, and most of the world's gold today is obtained by lode mining. Some gold mines are very deep. A mine in the Kolar district of Mysore, India, is more than 6,000 feet deep. The Morro Velho mine in Brazil and a mine in the Witwatersrand in South Africa have gone down more than 8,000 feet. Most gold is found "native" or free in quartz veins or alluvial (water-made) sands, often combined with silver Small quantities are found in ores of lead, iron, tellurium, and copper.

The large mines have mills that separate gold from ore. Chunks of ore are crushed and watered to form a pulp. The pulp is then treated according to the nature of the ore.

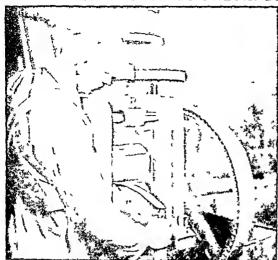
To extract gold from its ores three consecutive processes are usually used. The first of these is concentration of the gold and one or more of its compounds, such as silver, or eopper, by flotation (the ore is worked in a tank to cause the heavier gold and its compounds to sink to the bottom). The second process is a primary refining of the gold ore concentrate by cyanidation (dissolving tiny gold particles in a solution of sodium cyanide or potassium cyanide), amalgamation (attracting the gold from its ore with mercury), or smelting (melting). Final refinement to pure gold is usually done by electrolysis (attracting the pure gold to an electrode). (For an explanation of these processes, see Cyanides; Electrolysis; Mercury; Metals.)

Gold is soft, and if pure gold were used to mint coins or to fashion into jewelry or decorative pieceit would quickly wear away. To make gold durable enough for these purposes, gold is alloyed, or combined, with harder materials (see Alloys). The white gold used for some jewelry pieces is a gold alloyed with platinum, palladium, nickel, zinc, or silver Palladium-gold alloys are also used for making nonmagnetic watch springs. Green gold is a cadmumgold alloy. A very poor imitation of gold is called pinchbeck. It is made of a copper-zinc alloy; it appears so unlike real gold that "pinchbeck" has come to mean cheap and tawdry. The gold coins of the



the charge of the control of the property of the property of the control of the c

## HOW GOLD IS PREPARED FOR USE IN INDUSTRY



Gold is rolled into thin strips between the rolls of the machine shown here. The workman reduces the space between the rolls by turning the wheel at the top of the rolling machine.

for interior and sometimes exterior decorations, for picture frames and for experimental work in electricity

Gold is also the most ductile of metals. Wires compounded of silver and gold have been drawn to such fineness that 20,000 of them would be less than an inch thick and a length of 500 feet weighs only one grain. Gold lace is made of thin gold wires so fine that from 1 100 to 2 000 yards weigh no more than one ounce. These wires are flattened into ribbons, wound over silk thread, and then made into lace. Cheaper varieties of gold lace are made of thin copper wire plated with gold.

Rolled gold is produced by applying thin sheets of gold to a plate of soft alloy and rolling them together until the gold and the alloy are firmly welded Rolled gold is made into such articles as watcheases, jewelry settings, and other jewelry pieces

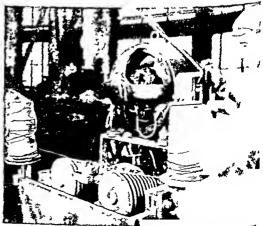
Gold resists chemical action to a greater degree than any other common metal. One of the few acids which will dissolve it is a mixture of nitric and hydrochloric acids Early experimenters called this mixture aqua regia ('royal water") because of its power to dis-olve gold The resulting chloride of gold, in combination with certain other chlorides, forms salts which are called gold chloride and are used in photography In combination with tin chloride, gold chloride produces a fine purple pigment, called purple of Cassius, which gives a rich pink, rose, or red color to glass, pottery, and enamel About three fourths of the world's production of gold is used for commercial purposes The rest is made into coins or is held in bars as a reserve to maintain the value of paper money. The United States no longer makes gold coms Its reserve of gold, worth many billions of dollars, is stored in heavily guarded vaults at Fort Knox, Ky. (see Kentucky).



Gold leaf is made by cutting the strips into squares, factleach between layers of gut, and pounding. Hours of process can reduce the squares to 1/250,000 of an inch in the case.



Here the workman is making gold wire. He passes a gold roll...) a machine where it is beaten by many little hammers. The baring reduces the rod to wire of the desired diameter.



This man is making wire by passing the gold through a suffersion of dies, each smaller than the last. Gold wire can be made that a 500-foot length weighs only one grain.



GOLD COAST All Air, a watches Brita ns Gold Coast Colony and Protect locate there for the first lime exarting in 1951 a Negro Airne colony experients in self government. The prime minister and the numbers of the cabinet and he leg slatty e seembly are ill Africans (for preture see



Afr.ca) Men and nomen yote on equal terms A noman was elected to the assembly The Gold Coast convers at II has a British governor who is respons the to the British Parl ament in London

The Gold Coast (total area 91 938 square in lea) a builde Gold Coast Colon; Golg 297 in no protectors 4shanti, (24 379) and the Northern Terr force 30 489) and the British trusteeship of Topics 31 430 410. The Gold Coast is north of the equator where Aircea west coast builges into the Allanne II we lends along the Gulf of Gu nea between French Togorand and the Evror Coast (for pare or Africa).

#### The Land and the People

The coast line is a or this illust on alturel harbons. A Litrox p. ray | lat | squarter district results for the production of the graduality rs | gal | pees of the inter-or plateau in occase on already. I call and plateau is a line in part of the lateau toward the sea. The co-till ray, is st the test part of the Gold Coast. Randiti is lainly easy on the plateau is alone and there are storaged and the season of the sea

ACCRAS MAN MADE HARBOR

A ong b enkwater protects Accra a docks f om the At antic waves The c ty grew around Bri ish Dutch and Danish forts remitrop at voodlands and gravslands. The country

semitrop of voodlands and grasslands. The country
is self-matered in the many small rivers emptying into
the sea. The largest river is the Volta.

The plonts and animals of the Gold Coast reg on are typical of most of West Affirms a coast The pr not plat trees are the sit cotton and hardwoods such as manageny choosy and camwood Smiller trees are the hambon and names. Orchids liller and great fems grown in the forests. Mangrowers grow at the new mouths. There are precipies becauses and others to 17 pre old a make are partners alongued temperature. The six of t

There are 4 905 000 people in the Gold Coast (1953 est mate) Almost all these are Negroes of the purest type found in Africa. Only in the far north has there been any considerable inixture with Hamites (see Africa). There are a number of organized tribes. The principal ones are the Fanti and Ashani.

The Ashants have there own language (Akan) and chag to the rold trad toons. There has is called the Assardsene For centures the clet aymbol of authority of the Ashanti is been there golden stool. It looks some that I be a gold plated chan and even the Assardel ene does not dare at out it. The Ashanti capital is Kamasi. Kamasi is a sprawing too in with a population of 77 689. There are mud and frame houses with tim roofs. Some have walls of corrugated iron. The crowded bazariar have small shaps with thatched canopies where artisans and traders. Lank then warrs. More print the peoples live messall.



ASHANTI BOYS ON A HOLIDAY

Many young Africans go for their vacations to camps maintained by the Gold Coast Department of Social Welfare.

villages where the huts are sometimes oval or shaped like mushrooms Farming, herding, fishing, and mining are the chief occupations

The capital of the entire Gold Coast is Accra (135,192). Here are more corrugated-iron buildings. There are also whitewashed mission churches, trading company warehouses, crowded streets, noisy bazaars, an international airport, and a broadcasting station. The principal port is Takoradi (17,327).

# Farming, Mining, and Trade

Gold and the slave trade first made this coast famous and gave it its name. Today, however, another

product has far exceeded gold in importance-cocoa. About one half the world's supply came from the Gold Coast until the spread of a blight called "swollen shoot." Eventually it was checked and the cocoa trade vabuilt up again. Cacao is raised in fore-t clearings and exported from Accra and Takoradi, which are connected by rail with Kumasi Other leading cropare sorghum millet, maize, and the kola nut The lumber industry is important. Gold is still produced along with manganese, diamonds, and other minerals Cocoa and these minerals are the chief exports The principal imports are cotton goods, petroleum products, machinery, and tobacco

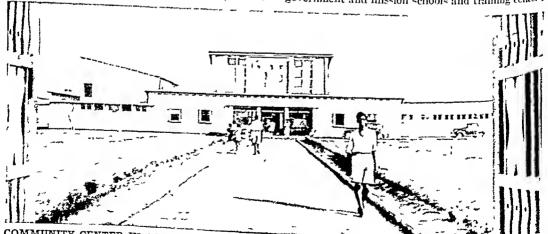
## History

Carly in the 15th century, Portuguese explorers landed on the Gold Coast Later in the century they extablished a settlement at Elmina as a headquarters for the slave trade Most

of the slaves from this region went to the North and South American colonies. The Dutch British and French joined the slave trade; all but the Bntish finally withdrew.

The British abolished slavery throughout the empire in 1833. They established the Gold Coast as a crown colony in 1874. The protectorates over Ashanti and the Northern Territories were established in 1991 after an Ashanti revolt had been crushed

In World War I Gold Coast troops, aided by French forces, invaded German Togoland After the war Togoland was divided between Britain and France Britain's mandate over Togoland became a United Nations trusteeship after World War II There are government and mission schools and training centers.



COMMUNITY CENTER IN ACCRA

One of the modern buildings in Gold Coast Colony is this community center. Note the mosaic over the entrance. In the past

the finest sculpture in Negro Africa came from the West Coss This is an excellent 20th-century adaptation of an ancient art.

GOLDENROD Growing with throughost North America the goldenrods brighten the late summer and autumn landscape. In the extern part of the continent there are about 60 different kinds. Several more grow on the Fadice coast. They fourth me very kind of surrounding—inopen feel is and roundades in woods along the occan beach and on mounta nicks. Most of them are golden yellow but one kind the siverrod is silver white.

Goldenoda belong to the family of composite flow ors (Composited) and are related to the asters. The tim flowers grow in clusters. Two of the commonest, species are the Canady and 1t of oldfield goldenode. Their flowers are gathered into numerous long plumes at the top of a sender stem 2 to 4 feet hg h Other kinds are shaped like low bushes with the flowers at the top of branching stems. The blue-stemmed or wrenth goldenod has a stem 13 inches tall closely set with lance shaped leaves. Growing out of the bases of the leaves are inch long sprays of flower Charming wreaths can be model from the plant.

Goldenrods belong to the genus Solidage The word means to strengthen or make whole referring to the supposed heal ag properties of the plant The Canada goldenrod is Solidago canadeans oldfield goldenrod is Solidago canadeans oldfield goldenrod is Solidago theoretical the state flower of Alabama Kentucky and Nebusaka

GOLDENGII A purple thattle rock ag wh the weight of a goldinch is a beautiful sight. These charming little birds are about five mole stong. The secharming little birds are about five mole stong the male is yellow anti black cap wines and tail for picture in color see Nature Study). The female is old vegreen and cull yellow. The memcal song results that of the European caged cunary hence the popular name of wild canny. In dight the orbit bounds through the air in a wavy motion calling per this or its re-file erres.

The nest is made of fine graves shre ided bark and moss I ned with thistledown TI ere are 3 to 6 blu shwh to eggs (for picture in color see Egg) The birds

feed cheffy on weed seeds
The goldfinch as a permanent year round resident in
most of the United States. It is the state b to of Vinimeeta (unofficial) Iown and New Jessey. The wile to
coldfinch the state bird of Washington is sumler to
the eastern species. The scientific name of eastern
and willow goldfinches is Spruns traits.

GOLDFISH The ancestor of the goldfish as the dull colored carp. The brilliant reds and golds with math ings of eliver and black have come from the pat ent work of Chinese and Japanese fish brenches. After goldfish cape not no river sand attenus their deceand ants gradually resume the greensh line of the early some of the most valuable goldfish are not golden at all. Their colors range from near white and pastel huses to starthing black

Goldfish are bred lor shape as well as lor color. A beautiful variety is the fringetail which sweeps its enormous shimmering tail in graceful patterns. Grocesque forms are also highly prized. A favorite is the black telescope fish with huge bulging eyes.

Gole sarply give goldsich enough air because the curving sche provide too small a surface for the water. The best apparatum contains growing visited plants (see Activities). Goldsich ser visually fed once a day at a regular time and only as much selection and any at a regular time and only as much selection and any visited majority for the selection of the sele

GOLDSHITH GUEER (1728-1774) By the tune Oliver Gol lemit was 30 years old h a cardesenses and love of fun had brought failure in everything had trace! Paully be become a hack, writer turning out books and art cles on all sorts of subjects for the London bookselbers. However he took time to who slowly and carefully on a few p exec that brought him lesting fame. They were a novel. The Vesze of Wakefield a play. She Steopy to Conquer and a long poem. The Descripted Village.

Goll mith was born in a small Ir sh village (usu ally believed to be Pallis near Ballymaton) on Nov 10 1728 His father was a poor Anglean clergyman Olver was the fifth of eight children.

OLIVER GOLDSMITH

oldsmith a friend Sir Joshua Reynolds painted this portrait.

In boyhood he was swkward and sight and an early attack of smallpovd sfigured haskin But he was clever and ready

w th a wity answer
When he was not
quite 16 years old he
entered Trinity Col
lege Dublin as a
sizar (a student
who works for his tui
tion) He was always
involved in some

who works for he tui tion) He was always involved in some ecrape. He studied little but he managed to earn a bachelor of arts degree by 1749 [Court Low and Productions of the court of the

Then Goldsmith studied theology law and meditane in turn for a year or two each but he preferred fishing and fluite playing to broks. He traveled for a year in Europe then settled in London. He ela med to be a physician with a degree from a fore guinaversity, and people called him doctor. Nobody came for treatment and so he turned to witing

Goldmath a cssays The Citzen of the World (IFE2) was the absent on of Sanuel Johanon, then England a leading man of letters (see Johnson, Same 1901) Johnson metuded Goldmath among his crude of finends Though they hughed at Goldmath a cold ways they hick than Writing brought for crudes, ways they hick than Writing brought for crudes, enterta meent and gambing. He died at 48, after trying to cure humosif of a lever.

# Golf-A GAME Everyone CAN PLAY

OLF. One of the best games for both young and old is golf. Expert players have been as young as 14 and as old as 60. Young or old, players like the game because each person plays for himself. The score depends solely on the golfer's own ability and effort. Golf also has a wide appeal as a physical exercise.

Each player can set his own pace. Intervals of play are mixed with walking and waiting for other golfers.

Golf stresses courtesy and sportsmanship. During play, a golfer stands quietly aside while his opponent makes his strokes. He assists in every way to give his eompetitors an equal chance. Should a member of a golfing party lose a ball, the other players search for it as thor-

oughly as if it were their own. Golf also puts a player on his honor, for he usually keeps his own score.

Low Scores Win on a Golf Course

A golf course consists of 9 or 18 holes, spaced from about 100 yards to more than 600 yards apart. Each hole is a metal cup 41/4 inches in diameter, which is sunk into the ground. The object of the game is to hit the ball into each of the holes in the fewest possible number of strokes. Every swing at the ball counts as a stroke even if the attempt fails to touch the ball.

At the beginning of each hole is the smooth teeing ground, or tee. From here the player drives the ball along the fairway, a broad avenue of turf stretching out to the front. Flanking it on both sides is tall grass, often studded with trees or shrubs, called the rough. The fairway may have no obstructions or it may be cut by a hazard, which forms a trap for the unwary player. A hazard is either natural, such as a brook or pond, or artificial, such as a mound of earth (bunker) or sand trap. If the golfer hits his ball into one of these hazards, he may have difficulty in knocking it out. But if he plays skillfully, he keeps his ball on the fairway and thus does not need to use any unnecessary strokes.

Par Is Every Golfer's Goal

At the end of each fairway lies the green, a comparatively level plot of irregular shape varying from about 2,000 to 8,000 square feet in area. Here the grass is cropped close for accurate play. Sunk in the green is the hole itself. The cup is marked by a flag or other device on a pole to help players locate the hole from a distance. A player completes a hole by hitting his ball into the cup. He then moves on to the next tee and continues to play in the same manner until he has made the round of the course.

Par for each hole consists of the estimated number of strokes required to reach the green plus two additional strokes (called putts) for the green itself. A golfer has only about one chance in 10,000 of making an ace, or hole-in-one, from the tee. More common is the cagle, or two strokes under par for a

hole, and the birdie, or one stroke under par.

A par 3 hole is usually less than 250 yards in length. Par 4 is from 251 to 445 yards; par 5 from 446 to 600 yards; and par 6 more than 600 yards. Normal par for 9 holes is 36. For women's par, one additional stroke is added on the longer lioles.

In match play, one golfer competes against another, and the strokes

MOST GOLFERS USE THE OVERLAPPING GRIP

The left hand holds the club firmly with the thumh on the shaft.
 The right hand closes around the club so that the left thumh fits into the right palm 3. This picture shows how the fingers grasp the club. The right little finger overlaps the left forefinger.

for each hole are counted separately. The player who wins the most holes is the victor. Whenever they both complete a hole in the same number of strokes, the hole is halved and counts for neither. In medal play the player with the lowest total number of strokes is the winner. He need not win the most holes. Amateur tournaments are usually conducted at match play; professional tournaments, at medal play.

A Golf Club for Every Purpose The ball weighs 1.62 ounces and is either 1.62 or 1.68 inches in diameter. It is made of many strands of rubber tightly wound around a core of rubber liquid or paste. The ball then receives a coat of vulcanized rubber. The cover is made of balata. The outer surface is dimpled to lessen wind resistance and give greater carrying power to the ball.

Golf clubs have slender shafts about three and onehalf feet in length. They are usually made of steel tubing. Each has a strong wooden or iron head with a striking face for hitting the ball. When driving off at the beginning of each hole, the player may "tee up" the ball on a small elevation. For other strokes the ball must be hit where it lies.

Each club is designed for a particular kind of stroke. To hit the ball long distances, golfers use wooden-headed clubs called drivers. Two hundred yards is a fair drive but expert players can average 250 yards or more. There are four wood clubs of this type: No. 1 (Driver), No. 2 (Brassie), No. 3 (Spoon), and No. 4 Wood (Short Spoon or Cleek).

The iron clubs, or irons, are designed for hitting the ball low and far, or raising it high in the air and letting it fall dead, or lifting the ball out of sand traps and tall grass. Each club is named but is more familiarly known by number from 1 to 9. The low-numbered irons drive the ball for medium dis-

## HOW AN EXPERT GOLFER HITS THE BALL

One of the most important parts of the golf swing as the position of the golfer's teet (called the stance). Below at left are stances for five common strokes. The correct stance helps produce a good awing, as shown below at the right







ASHIE SHOT The galler sads closer to the batt than to the shots shore. The MASHIE SHOT





THE PUTT A line drawn fbrough the ball would pass near the gollet e latt to his factor together with the toes po used atraight aboud



THE BACKSWING The golder bonds aughtly at the weigt with his waight resting of teet. He winds up by turning her body to the right. Shoulders, arms, and class to farm. The both arm is held after ght without firthers. He offer along without profiles.



THE TOD OF THE SWING. The golder turns ustiff the glob shalf in about herizontal to the ground life begins the newsware by termine his begins the lack as well successful the successful pulls the sundown. The write structure into it are with the left are Nyseci as more important than taken down. The write structure into it are with



OWNSWING AND FOLLOW THROUGH The solin his this use B his stress held straight. The club head follows a last of the bed hownsis Break. The soline a head is turned by the right shoulder

# HOW GOLF CLUBS "LOFT" THE BALL INTO THE AIR No 1 (DRIVER) No 2 (BRASSIE) No 3 (SPOON) No 4 WOOD

WOOD CLUBS The woods are the long-distance hitters of golf They are used for driving off the tee and when long shots are needed on the fairway. Notice that the more loft (slant) there is on a club face, the higher the club drives the ball into the air

tances. The high numbered clubs are beavier and shorter. They have more loft—that is. slant on the striking face. The greater the loft, the higher the ball rises in the air and the shorter the drive. These high-numbered clubs are valuable for chip shots to lift the ball onto the green and pitch shots to clear a hazard. On the green, golfers use sbort. straight-faced clubs called putters. The clubs are carried in a bag by the golfer or his caddie.

The beginner should have at least five clubs: a driver (either No. 2 or No. 3 wood), the No. 3, 5, and 7 irons, and a putter. The maximum number of clubs that can be carried in official tournament play is 14: four woods, nine irons, and a putter.

Tournaments for Amateurs and Professionals In the United States the rules for amateur players are made by the United States Golf Association (USGA). Professional golfers, such as those who play for money or who receive money for giving golf instruction, follow the rules made by the Professional Golfers Association (PGA). The associations conduct tournaments for amateurs and professionals respectively. Both amateurs and professionals compete in open tournaments. Some of the leading tournaments include the United States Open, Men's Amateur, Women's Amateur, and Men's Professional; and the British Amateur and the British Open.

In 1930 Bobby Jones of Atlanta made golf's only "grand slam" by winning the United States Open, the United States Amateur, the British Open, and the British Amateur. Competition between British and American golf teams includes bicinial play for the Walker Cup (amateur men), the Ryder Cup (professional men), and the Curtis Cup (amateur women).

Golf Developed in Scotland

Games similar to golf have been played in several countries since ancient times. But the modern sport

No 1 No 2 No 3 No 4 No 5 (DRIVING IRON (MIDIRON) (MID MASHIE) (MASHIE IRON (MASH E) No 7 No 9 PUTTER (SPADE MASHIE) (MASHIE N BLICK) (PITCHING NIBLICK) (NIBLICY)

IRON CLUBS. The irons give accuracy rather than long drives. Nos 1, 2 and 3 are distance clubs, producing drives from 210 to 150 yards. Nos. 4, 5, and 6 are lofting irons for arching the hall into the air. They produce drives from 150 to 100 yards. Nos. 7 and 8 are pitching clubs for short, quick-rising shots. No. 9 lifts the hall out of the "rough," such as sand or heavy grass. The putter has a vertical striking face to roll the hall across the green to the cup.

developed first in Scotland in the 14th or 15th century. The Scots played golf so enthusiastically that some feared the game might replace the national sport of archery. As a result, Parliament banned golf in 1457. But after King James IV took up the sport about 1490 the law was not enforced. Scotland is also the home of the world's oldest golf course, St. Andrews at Fife, founded about 1552.

In the United States the modern game was first played on a three-hole course laid out in a pasture at Yonkers, N. Y., in 1888. Golf, however, received little popular support until 1913, when Francis Oumet, a 20-year-old former caddie, won the United States Open Tournament over heavily favored British stars Ouimet's victory gained nation-wide attention and thereafter interest in the sport boomed. In the United States today almost three million people play golf each year on more than 4,900 courses. About a thousand high schools and colleges now teach golf as part of their physical education programs

In 1949 Golf's Hall of Fame to honor outstanding players was established at Evanston, Ill. The first four candidates selected were: Bobby Jones of Atlanta; Francis Ouimet of Boston; Walter Hagen of Detroit pioneer in international professional tournaments; and Gene Sarazen of Germantown, N. Y., prominent professional for more than 25 years. Additional nominations are made by the Golf Writers Association

COMPERS SAMUEL (1850 1924) The life of Samuel Compers is the story of a poor immigrant boy who became the first great labor leader in America. Gom pers helped found the American Federation of Labor and he developed it from a feeble group of 25 craft unions into a powerful body of almost 150 un ons wth about 4 000 000 norkers

Gompers was born in a London tenement the son of a poor Jewish c gar maker To help support his family he left school at the age of ten to work for a shoemak er Several months later he became apprenticed to a cigar maker

When he was 13 years old his parents brought him to he v York City He got work in a eight factory where the workers had a plan for self education Each one in turn read aloud from books or news papers while the others rolled carars Each day all

tle cigars were equally divided among the workers When Compers was 17 years old be marred a work mg g ri Sophia Julian They raised three sens and two dai ghters. A year after Soph a ded in 1920 Compers marr ed Gertrude Neuscheler a music teacher who

later became active in the union labor movement In 1877 the Cigarmakers Union was all but ruined by losing a prolonged strike. Gombere became press dent of his local and he and a few others started to re build locals and the nat onal union according to the r ricas They believed that socialist programs for cooperative businesses or taking over control of business were impract cal Workingmen they thought would stay united only when striving for higher wages and better conditions Labor parties could not compete successfully with the skilled politicians of the great part es And they believed in drawing all the local



unions of a craft together into a single strong na tional union

Gompers was a dramatic speaker and he could work endlessly without tir ins. Soon he built his national up on into a model for all others In 1881 he helped organize a group of national unions which took the name Ame tean Federation of Labor in 1896 Gombers became president and except for

one year (1895) he held the office until he died in 1924 During the first World War Compers served as anokeaman for labor. In 1921 he became president of the Pan American Federat on of Labor

Goose Many people think that the goose is silly and stup d But some nature students say it is per hans the weest of birds. For example, when great flocks of wid geese migrate they carefully som their feeding grounds for danger. They fly swiftly back and forth over a marsh or lake or field and if they spy a hunter they soar sway to another feeding ground Nature students also point out that the domestic goose can be easly trained to be a pet and to obey orders Geese are strong and spirited If a person threatens to harm a young goose or goel ng the parent goese will rush at him hiss ng and beating him with the r huge 1 owers 1 wings

There are about 30 speces of wild geese belong ing to the same family as the ducks and swans. Tha

WILD GEESE AT HOME FOR THE SUMMER IN CANADA



male, called the "gander," resembles the female in plumage. All breed in cool and temperate regions, some in the Arctic Circle. All migrate south for the winter. Geese live to be at least 30 or 40 years old.

Of the European wild goese the "graylag" is the most representative. It ranges over nearly the whole of Europe and northern Asia. and is the original of most domestie geese. China is the nome of the "swangoose," the largest known variety, and the parent stock of the domestie geese of the Orient. The "Cape Barron goose," which is remarkable for the

The "Canada goose" is the most

beak, is found in

of its

shortness

Australia.

familiar of American wild geese. It is a grain-feeding bird and its flesh is most palatable. Breeding in Canada or the northern United States, it stops in its southward migration to visit the grain and stubble fields of the great northwest, often remaining in the Dakotas until mercury has reached 20° below zero. This is the harvest time for sportsmen, and often family larders are provided with meat from this source for the entire season. The birds are about 40 inches in length, light gray plumage below and darker grayish brown above, with a black head. In their spring flight north they are welcomed as an unfailing sign of coming summer. They fly high, in a V-shaped wedge, their joyous honking claiming attention of young and old:

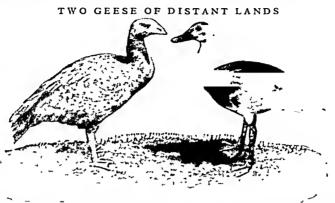
Hark what a clamor goes winging through the sky! Look, children! Listen to the sound so wild and high! Like a peal of broken bells,—kling, klang, kling-Far and high the wild geese cry, "Spring! It is spring!"

The "snow goose" is a pure white aretic bird that migrates to the Gulf States in America and to Japan on the Asiatic coast. They are still numerous along the Pacific coast during the winter. The "brant" is a small goose common throughout the Northern Hemisphere. In early autumn these birds come by the thousands to the coasts of the United States, and are a plentiful and valuable source of food supply for our tables.

Domestic geese date from a very remote period, as they are shown on the monuments of ancient Egypt. Wing-feathers of the goose feathered man's arrows in the Middle Ages, and supplied him with quill pens until steel pens took their place.

Geese belong to the order Anseriformes. Scientific name of Canada goose, Branta canadensis: of American brant. Branta bernicla hrota; of snow goose, Chen hyperborea.

GOOSEBERRY. The tart flavor of the gooseberry is enjoyed in sauce, jam, and marmalade, but does



To meet the sharp-nosed goose on the left, you would have to go to Anstralia, for he is n Cape Barron goose with an extremely short beak like a turkey's. He can get mround on land much more rapidly than the ordinary goose, but he lacks the family fondness for swimming and flying. Facing him is the African spur-winged goose, who gets his name from a long spur on each wing. He has more of the family nose, as you see.

not greatly tempt one to pick and eat the raw fruit. Even as the fruit ripens, changing from green to a rich dark purple, the acid flavor lingers. especially around the coarse seeds. So the gooseberry is not very popular among garden fruits, and much of our supply comes from the bushes growing wild all through the northern part of the United States. Varieties of the gooseberry are also

native to the north temperate regions of the Old World, but everywhere the cultivation of the fruit has been neglected with the exception of England. There cultivation began in the 16th century, with the result that English markets have gooseberries as large as plums and sweet enough to eat just as they are picked from the bush.

The gooseberry is a hardy spiny shrub closely related to the currant. Scientific name, Ribes grossularia.

GOPHER. In the early days French settlers gave the name "gopher" to several species of burrowing animals of the rodent family. The name comes from the French gaufre ("honeycomb"), and was given because the little animals honeycomb the ground by burrowing in it. They do much damage to the crops and are considered a great pest by the farmers.

The prairie pocket gopher commits its depredations in the fertile prairie region of the farther northwest. It is about as long as a small rat, with a body considerably thicker; in the skin of each check is a large pocket or pouch in which to carry stores of food. The fore feet are very strong and are equipped with long claws for digging.

With his hind feet the gopher scrapes from beneath his body the dirt the front feet have dug and throws it back a distance of 8 or 10 inches. When a little pile has been made in this way, the gopher turns around and putting his forepaws in front of his nose pushes the dirt before him through one of his "cellar doors" and so makes the little piles called gopher hills.

The gopher's teeth make something like 200 strokes a minute. The enamel plates of the molar teeth are arranged in such a way that 38 distinct single cuts are made with every forward thrust of the jaw and 28 by the back stroke Multiply that by 200 and it amounts to over 13 000 cuts every in nute

To keep food for winter use gophers have regular storehouses—pantries as it were—to which they carry roots and other food in their cheek pockets. In AN EFFICIENT DIGGER UNDERGROUND



A popher is well equipped for his under good. These locitative on the fe sleed of our the bur one. The dage is positive to the feel of good the bur one. The dage is positive feel of the feel of good to the feel of the feel

one gopher storehouse in the winter time were found nearly 50 (uper lily bulbs gathered the previous date derived through a timel from the tiger lily bed to the gopher pantry. Copher burrons are extended years ster year and in many esseet the tanels dug by a single gopher in 12 months would measure a mile of more if straightened out and placed end to end. The tunnels are full of crooks and turns caused by gung around stones or following leads of soft earth

going around stones or following leafs to soft entire. The so-called striped gopher of the Central States is really a ground squirrel but it is no less troublesome. Natural enemies of these pests are the wavel and the gopher-snake. Farmers also try to keep their numbers down by traps and posson.

keep their numbers down by traps and possin Po ket gophers ere a large family the United States having three genera with 78 species and subspeces which yary widely in size and color—Se cut fix name of the prace pocket gopher Geomys bursarius

GORDOY GAS CHARLES GLORGE (1833 1889) ECHICA GORDO SHOWS COURSELVES AND ACTUAL OF THE STATE OF T

He was the son of a British general was educated at the Royal Mil tary Academy at Woolwich and began his career in the British army in 1852 with a heutenant's commission. He served with conspicnous callantry in the Crimean War, and afterwards in Asia At the age of 30 we find h m commander of the Ever Victorious Army of China putting down the Ta ping rebels who sought to drive out the un progressive Manchus and to establish the reign of In 1864 within 18 months after eternal peace Gordon had taken comman I the ten year-old rebellion which had cost millions of lives was relentles by suppressed. The grateful Chine a thereupon conferred on Gordon the yellow tacket and the peacock feather of a mandarm

The next mue years of his life were spent in the more prosses but perhaps more useful work of constnicting forts in England and serving on various unternational communs ions. Then in 1873 be each electric work and the service under the Khed veof Egypt as governor of the Egyptian equational province. For seven years he bloomed to estable heave and order but his work was

not very successful
In 1834 four years after he resigned this commission he was sent back to the Sudan by the Briti h
government. Ble commiss on was to bring out of the
region of the Table of the Sudan beautiful of the
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whose aim was not unlike that of the Taingar peles
in China. But in disregard of his orders General
Gordon sought to hold the direct and was besuged
in the city of Khartum. For ten monits the city
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service in Bollom, at barva but is erraise commander.

The death of Gordon raised a storm of indignation in England against the slowness of the government in

CHARLES GEORGE CORDON One of England a Warrior Horose

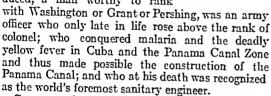
sending and Glad stone then prime minister pointed out that Gordon had disobeyed his orders in not leaving the Sudan when he could but nublicopinion could not forget his chivalrous heroism and regarded him as a martyr Sobewas -to his o via head strongness and tle spir t of imperial

one of Registed a Warner Herees asm which how ever did not rule the councils of the Laberal government then at the belin in England Tennyson wrote the ep taph for Gordon's merior at in Westmunster Abbey

# ONE OF AMERICA'S GREATEST CONQUERORS

The Man who Vanquished the Deadly Mosquito

ORGAS, GEN. WILLIAM CRAW-G FORD (1854-1920). It is a great thing to uphold the honor of one's country on the battlefield. especially when the conflict is in defense of liberty, of justice, of the rights of men peaceably to rule their affairs. But there are conquests even greater than those over hostile armies-such are the conquests over the forces of disease and death and the suffering of little children. And so we may truly say that one of the greatest conquerors that America ever produced, a man worthy to rank



Gorgas was born near Mobile, Ala., of a family well known in the state. His mother, Amelia, was a daughter of Judge John Gayle, a former governor of Alabama. Gorgas' father, Josiah, became a general in the Confederate army and the collapse of the Southern cause brought the family a full share of hardships. "I first came to Baltimore," said the son, at one time, "about 45 years ago—a ragged, barcfoot little rebel, with empty pockets and still more empty stomach. My father had gone south with Lee's army. At the fall and destruction of Richmond, my mother's house, with all that she had, was burned, leaving her stranded with six small children. She came to Baltimore, and was there cared for by friends. These memories are vivid with me, and can never be effaced."

Young Gorgas received his education at the University of the South at Sewanee, Tenn., of which his father had become president. After graduating from Bellevue Medical College, New York, he entered the United States Army as a surgeon, and while stationed at Fort Brown, Tex., had his interest first aroused in the terrible scourge—yellow fever—which he was later to do so much to combat and conquer.

# Dr. Gorgas in the Spanish-American War

During the Spanish-American War Dr. Gorgas served as chief sanitary officer of Havana, Cuba, which for years had been notorious as a center of yellow fever. There he won his first world fame by ridding the city almost entirely of this plague. He was practically the first to apply the new discoveries—that both malaria and yellow fever can be spread by the bites of certain species of mosquitoes, which in



WILLIAM CRAWFORD GORGAS

turn have become infected by biting persons infected with these diseases (see Mosquito).

In reward for his work at Havana Dr. Gorgas was created colonel by special act of Congress, and shortly afterward was appointed as chief sanitary officer of the proposed Panama Canal.

The story of the great work which he did there is told more fully elsewhere (see Panama Canal). Colonel Gorgas and his men worked especially in four great ways: They destroyed the homes of mosquitoes during the

larval stage within a hundred yards of all human dwellings; they destroyed all protection for adult mosquitoes; they screened all houses with wire screens; and they destroyed all breeding-places, either by draining stagnant waters dry or sealing them with crude petroleum, which spreads a film over the surface and kills the larvae.

## The War against the Death-bearing Mosquito

Never was there known so great a "pouring of oil upon troubled waters"; never was there known so strange a fight between an army of hundreds on one side and hundreds of millions on the other. On one side were a few hundred men-doctors and ditchers, drainers and dispensers, oilers and clerks and sanitary inspectors-guarding 40,000 or 50,000 laborers and their families, scattered over 450 square miles in about 40 camps and villages. They were doing the biggest piece of engineering that has ever been done on the earth, digging a way from sea to sea, cutting up a mountain for the sea to pass through, and building huge walls to hold in the sea as it passed. On the other side were the mosquitoes. They rose by millions from waters that were dark and still, and they filled the air with a ceaseless hum. They flew into every open door and window in their hungry search. The deadly effect of their bites was to poison the lifeblood of all Panama, as their ancestors had poisoned it for ages with yellow fever and malaria.

Without the remarkable work of Colonel Gorgas in stamping out these diseases, the canal might never have been completed, certainly not without appalling loss of life. It has been estimated that in the ten years that the canal was building he saved more than 70,000 lives, and \$\$50,000,000. His achievement marked an epoch in the history of sanitation, and in the work of making the tropics habitable for the white man. It was not too much now to expect, as Colonel Gorgas prophesied, that "some day a case of yellow fever will be regarded as a medical curiosity."

When the canal was finished in 1914 Colonel Gorgas was promoted to he surgeon general of the United States Army and the next year he was made major general In 1920, while on his way to dudy vellow fever in Africa for the British government, he died in London. His body was brought to the United States for burnal in Arlington National Cemetery

GORRIA Largest of all the manble ages is the gorilla, a native of the dense forests of equatorial Africa Ever since the first explorers penetrated the African jungles this animal has been a pet subject for terrifying stories most of them far from the truth Though extremely powerful the gordla is not as monstrous or ferocious as is commonly be heved When walking erect which he rarely does, the average gordla has a height of only about five and one half feet yet he would weigh 350 pounds His legs are short his arms long and his heavy, broad-shouldered body is covered with long dark

hair which turns gray in old age The gorills can walk or run on all rours but does so on the knuckles of his hands He can chinb trees with more agility than a man It is the face of the gorilla that is so terrifying With black, nearly bare ekin, deep-set eyes rimmed with bushy brows a flat nose, and protrucing laws, the gordis a features are indeed ugly Unless cornered, he will not attack, but when excited he thumps his chest with both fists and breaks out into wild TOATS

Gordias rosm about in small family ground, feeding on the shoots of bamboo wild celery, and other tender plants They sleep on the ground or sometimes in trees but have no

permanent abode. A preserve for gonillas the Parc National Albert in the Belgian Congo, was established in 1925 and now has an area of more than 3 000 square miles (See Apr.)

GOTHS First of the northern barbarians whose successive assaults brought low the nught of Rome were the Visigoths or West Gotha Where the Gotha first came from is not definitely known These were stories told by their old men of a time when their people had dwelt far to the north on the shores and islands of what is now Sweden Then had come long slow wanderings, through the forests of western Russia, until they reached the shores of the Black Ses In a hundred 3 ears of contact with the Romans they learned many things, especially the Christian religion

This was spread among them by the efforts of a convert of their own race a sautly man named Ulfilas For more than 40 years he labored first making a Gothic alphabet into which to translate the Bible and then teaching his people the new faith. This Bible translated by Ulfilia is centuries older than the earliest writing which we have in any other Testtome language, so its historical value is very great

For a time the Goths ruled a great kingdom north of the Danube River and the Black Sea Then the Huns swept into Europe from Asia, in 375 Ap. conquering the Ostrogoths or East Goths and forcing the I regoths to seek refuge across the Danube within the boundaries of the Roman Penpire. In a builde fought near the city of Adrianople in 378 the Visi guths defeated and slew the Emperor Valens For a tune they haed peaceably on Roman territory, then, on the death of the Emperor Theodosius in 395, they rose in rehellion under their ambitions young king Alane and overran a large part of the Eastern Compare Rome steelf fell into the hands of the impetuous Goths in 410 (see Alarie)

Alarica successors led their A BABY GORILLA people out of Italy and set up a powerful kingdom in southern Goul and Spain In the year 507, the Vasgoths in Gaul were defeated by the Franks and were forced beyond the Pyrences For 200 years their kingdom in Spain flourished It did not come to an end until 711, when the Moors crossed over from Africa and in a terrible eight day battle destroyed the Visi gothic kingdom (See Spain)

The O trogothe for a time formed part of the wast horde which followed the king of the Huns Attila settling in the lands south of Vienna when the Hunnish kingdom fell apart Their national here was Theodone the Great a powerful and romantic figure who became king in 474 When a boy be

s gor lis? But he s say, and s develop theat he treth and s

had been sent as a hostage to Constantinople and had there been educated In 488 he invested Italy, with the permission of the emperor at Constantinople After several years of warfare Theodoric captured and slew Odosrer, a barbarum who had there usurped the Roman power and founded a powerful kingdom which included all Italy together with lands north and east of the Adrestic Sea His reign was one of the ablest and best in this period and his kingdom was one of the great "might-have-beens' of history He failed largely because no permanent fusion was effected between the barbanans and the Christian-Roman population All his wise plans for bringing this about proved futile because the Ostrogoths, in common with most of the German barbarians, had been converted to Amantson, an heretical form of Christmanty, and so were hated by the orthodox

After Theodoric died in 526, the generals of the Eastern Roman Empire reconquered Italy (see Justinian I). After fighting a last battle near Mount Vesuvius in 553, the Ostrogoths marched out of Italy. They merged with other barbarian hordes north of the Alps and disappeared as a nation from history.

GOUNOD (\(\bar{q}\)o-n\(\bar{o}\)), Charles François (1818-1893). Most music lovers know the work of Charles Gounod. His famous opera 'Faust' is presented throughout

the world. Some of his sacred music is performed in Christian churches everywhere.

Gounod was born in Paris on June 17, 1818. The boy inherited musical talent from his mother, an accomplished pianist. After her husband's early death in 1823, she taught music to support the family. She gave Charles his first music lessons.

When he was 11 years old, Charles won a scholarship to the Lycée St. Louis, a Paris boarding school. He worked hard at his studies, but he found time to write little tunes in his schoolbooks. His mother objected to his interest in music as a career at first, then allowed him to study composition on his free Sunday afternoons.

Gounod entered the Paris Conservatory in 1836, and three years later won the Prix de Rome scholarship. At the French Academy in Rome he studied church music, particularly Palestrina and Bach. On his return to Paris he became organist and choirmaster of the Église des Missions Étrangères (Church of the Foreign Missions). As a young man he was handsome, serious, and very quiet. He studied theology, and for a time considered becoming a priest. But in 1848 he left his church post to compose music for the stage.

His first opera, 'Sapho', was a failure, but it brought his name before the critics. His next two also failed. In 1852 he became director of Orphéon, a union of Paris choral societies. The same year he married Anna Zimmermann. They had two children.

Gounod had thought of writing an opera based on Goethe's 'Faust' during his student days (see Faust Legends). When he was 40 years old, he fulfilled this ambition. The work was performed at the Theter Lyrique in Paris on March 19, 1859. The French did not acelaim it at first, but it became instantly popular elsewhere in Europe. Two later operas, 'Mireille' (1864) and 'Roméo et Juliette' (1867), were only moderately successful.

In 1870 Gounod became head of the British Royal Choral Society. He was sick and unhappy in England

and after five years returned to Paris His last years were devoted to sarrel music. He wrote two great oratorios 'La Rédemption' (1882) and 'Mors et Vita' (Death and Life, written 1883) His most famous religious work is the 'Ave Maria' (Hail Mary) based on Bach's 'First Prelude in C Major'. Gounod died Oct. 18, 1893, at St Cloud. France.

GOURDS. Today gourd vines are grown in back yards or on farms as ornaments or screens. The vine produces a thick mass of downy leave Gourds bloom in early summer and produce either yellow or white blosoms, depending on the variety. But gourd vines were useful as well as ornamental to the settlers of pioneer days

and to primitive peoples of all times. In the late summer the many-shaped, hard-skinned fruits appear. These can be used to make dippers or bottles.

The various kinds of gourd vines produce gourds of many strange shapes and lengths, from a few inches to several feet. The gourd called "vegetable sponge" or "disheloth" (Luffa cylindrica) has a fibrous interior This can be dried and used as a vegetable sponge.

Gourds belong to the family Cucurbitaceae. Other members of the family are pumpkins, squashes, and melons. Most pumpkins and squashes have yellow blossoms. In Europe, the flowers as well as the fruits are cooked and eaten as vegetables. The plants commonly used for ornament in the United States are varieties of the white-flowered, bottle gourds or the calabash gourd (Lagenaria siceraria) and the yellow-flowered gourd (Cucurbita Pepo var. orifera).



Gounod composed beautiful music for both opera and church.

# FAMILY to NATION—The Story of GOVERNMENT

GOVERNMENT. The dictionary gives many meanings for the words "govern" and "government." But most people think first of one kind of activity—making rules and providing services that help people to live together safely and conveniently.

Almost anything any group of people does must be governed by some sort of rules. Their activity may also need help to make the rules work. Two teams would have a hard time playing baseball unless they had rules for the game and an umpire to enforce the rules. A playing field and equipment must also be provided. In order to live together, even the members of a family must observe rules, such as coming to

meals at certain times. And the parents must provide help, such as a place to live, food, and clothes.

The people of a town or city need many rule. Nobody can drive an automobile with any safety, unless every driver stays on his own side of the road Stop signs or stop-and-go lights at busy street intersections help enforce the rules.

The community needs police and fire protection schools, and many other services. It needs officials and employees to provide these services. To pay for everything, it must collect taxes or other revenue. Finally, it must have rules to say how things shall be done; and the officials and police enforce the rules.

Throughout the world large numbers of commun. ties and the countryside between are bound together in organizations called states or nations. The rules made by these organizations are called laws or statute Thus the word 'government may reter to making and enforcing rules or providing services for any group from a family to a nation. For example a rolf club may have a board of governors Usually however. the word means governing activities on behalf of a community a state or a nation

#### Many Kinds of Laws

Some people think that laws are made only to furbid wrongful actions Actually most of them help to promote efficiency or safety or to give service. Examples are laws which provide for traffic regulations on I for building roads to carry the traffic

Another common mistake is to regard law as omnipofent Some meanle think that when there is any problem to be met, all you have to do as pass a law about it Laws may be very helpful in some cases and in others they may do actual harm. Whether a given evil can be remedied by law is frequently a difficult question. It will depend upon the nature of the evil and the wisdom of the law Moreover, if the people will not obry the law particularly m a democracy, the law is futile and its failure may weaken respect for other laws Only such laws will be effective, therefore, as have the approval of a substantial majority of the population.

There is also a mistaken notion that law interferes with liberty Unwise laws may destroy liberty, but wise laws that regulate the conduct of each so that one doce not interfere with the liberty of others are the real basis of such freedom as we actually enjoy. Were it not for such laws, cruminals could take away our property, destroy life burn down homes, and commit other equally atrocious crimes We have the liberty to enjoy our homes and feel secure in our property only because of laws that forbid interference with the freedom of the individual, and that command the general respect which leads to strong

#### enforcement (See Law ) How Government Developed

In the early stages of human development, long before recorded history began, there was neither state nor government Doubtless at took many thou sands of years for men, gropung their way through the mental darkness of an agery to form the idea of a state It is supposed that as the primitive population increased in size group association naturally arose, beginning with the family and the tribe (see Family)

When men began to domesticate animals and to practise agriculture, they needed larger organizations. Presently these agricultural groups developed into city-states Commerce between groups began to grow and the groups began to develop the machinery of government to deal with the new problems

One of the fundamental elements in associated living is the fact that people vary Some are stronger, some waer, some more honest more skilful, more canable A few are natural leaders, the many are natural fallowers. Out of this difference in capacity and ability grew the social and economic strate of mankind The strong and the clever became a ruling class which furnished chiefs war leaders, priests and kmgs The least capable of all became slaves Through many centuries the idea persisted that it was the right of some in rule, the duty of the many to be ruled Ruling became hereditary in families and rulers gamed absolute power over their "subjects"

#### Origin of Kinds

The first kings usually were successful warriors who had won many battles and captured much land over which they were able to hold sway by force of arms The laws of those early kingdoms were chiefly concerned with raising armies and collecting taxes. In Levot Babylonia, and Assyria, religion was so closely identified with government that laws came to have a supernatural sanction and a supposedly divine origin. The kings came to be thought of either as lesser gods or as the ambassadors of gods, and the Laws which they made were considered sacred

It was not until the time of the Greek city states that government and laws began to assume a different aspect in the eyes of the people About five centuries before the buth of Christ a group of Greek scholary. known as Sophists, taught that "man is the measure of all things" This new doctrine gave rise to the idea that man had a right to determine his own rules of conduct, and that he might inquire into the basis and nature of the government under which he hved, if he found that government to be unsuited to his needs he had the right to change it

Origin and Spread of Democracy Out of these ideas grew the beginnings of democracy The word "democracy ' is a union of two Greek words; demos, meaning "people," and kratos, meaning "rule" Actually, however, only a small part of the people in the Greek city-states enjoyed full rights of citizenship Among the Romans some advances in democratic covernment were made by granting popular rights and extending the privileges of citizenship But the Romans were a practical people Though they were much interested in conquering and governing, they were not particularly interested in the theory of covernment It is noteworthy that only a few English words such as senate, describing par ticular organs or officers of government are of Roman organ, almost without exception the words which relate to the theory of government, such as autocracu and democracy, came from the Greek.

In the centuries immediately preceding the estabhishment of the empire in 31 B c. Rome, though a republic in name was ruled by an aristocracy, the senate Literally the word ansforany means "rule of the best" The ideal aristocracy comprised men of supersor wisdom, who ruled conscientiously in the interests of the people. When those in power allowed their own selfish interests to predominate, discontent arose among the people, and the power of the senate gradually declined until Julius Caesar seized supreme power. His successor, Octavian (Augustus), established the Roman Empire, which was essentially an autociacy, though the forms of the republic remained in existence for some time.

## Teutonic Changes in Roman Policies

The tribes of barbarians which overran the Roman Empire in the 4th and 5th centuries of our era did not have a fully developed system of government; but they had one principle which had a great influence on later governmental systems. This was the idea that every man has a certain liberty which no law ean take away from him. In other words, they believed that government existed for the benefit of the individual, as against the Roman idea that the individual existed for the benefit of the government. The Teutonic tribes carried their democratic idea of the relationship between the eitizen and the government across the sea to England. There it thrived and became the basis of governmental forms which are the foundation of many existing political systems, including the American.

In English history, whenever kings went too far in their opposition to this theory, they were defeated. It was one of the great events in the history of government when, on a memorable June morning in the year 1215, King John of England, surrounded by angry barons, signed the Great Charter (Magna Carta) against bis will. This famous document established the individual rights of subjects against kings, a turning point in history. Today Great Britain retains the form of a monarchy, but its spirit and most of its political institutions are those of a democracy.

Chief Types of Government

The authority of a state to rule is its sourcignty. In a democracy all the citizens possess an equal share of the sovereignty. Democracy in the United States is associated with the republican form of government and representative democracy. (See Democracy.)

In an autocratic form of government, sovereignty belongs to the rulers. If the state is governed by a small ruling class, it is an oligarchy. No modern state is governed by an avowed oligarchy, although control of the state by a minority in its own interest is often referred to as oligarchic rule. If the state is governed actually or in theory by a single ruler, the king, it is a monarchy (from the Greek word meaning "sole ruler"). A limited monarchy is one in which the ruler's power is limited by the power of the nobles, by a constitution, or in some other way. All existing monarchies are, in theory at least, limited; and in most the king is important chiefly as a symbol of the unity of the state. England, Denmark, and the Netberlands are examples of limited monarchies.

A new form of autocracy, which developed following World War I is the totalitarian state. Under the totalitarian system, absolute sovereignty resides in the state, which possesses the power to regulate work, education, science, religion—indeed every phase of the life of the people. The individual has "rights"

and liberties only in so far as the state confers them. The totalitarian state tolerates only one political party. Usually it is governed by a *dictator*, who has unlimited power (see Dictatorship).

World War II put an end to the totalitarian governments of Germany and Italy (see Fascism). After the war, the totalitarian eommunistic system found in Russia spread over most of eastern Europe and into the Far East. (See Communism; Russia.)

## Treason and Sedition

Treason is the most serious offense which a citizen ean commit against the state. The third section of Article III of the United States Constitution defines treason against the United States as "levying war against them or giving aid and comfort to their enemies." Thus treason in wartime includes any act by a citizen which furthers the hostile designs of the enemy. In time of peace it may be considered treason to attempt to overthrow the government by force or to put up organized resistance against the execution of any law. A citizen who is convicted of treason may be punished by death or by imprisonment and fine. Sedition in modern times is applied to language or conduct which disturbs public order and the tranquility of the state. It differs from treason in that it is not accompanied by any overt act against the state. (For further study, see Reference-Outline for Political Science.)

GRAHAME, KENNETH (1859-1932). When Kenneth Grahame's small son Alastair went on a vacation, he asked his father to continue his bedtime stories by mail. These installments, mailed daily, became the first chapters for one of the best of all children's books, 'The Wind in the Willows'.

## YOUR FRIENDS IN THE WILLOWS



In these three pictures are the chief characters in Kenneth Grahame's beloved book, 'The Wind in the Willows'. At left Mole begins spring cleaning; right, he and Rat are sculing



Here Toad (center), Rat, and Mole listen to Badger's plan for recapturing Toad's ancestral home from the brigand Weasels.

Kenneth Grahame was born March S, 1859 in Edinburgh, Scotland For a time the family HEAD HOUSElived at Ardrishaig a small fish no village where Kenneth came to know boats the sea and the small animals that live near the wharves. When he was nine he was sent to St. Edward a School at Oxford England In he last term he was captain of the Rugby team and head of the school the highest honor his schoolmates could give him. He wanted to at tend Oxford University but his parents had d ed and he had to co to work. In 1879 he began as a clerk in the Bank of England

Grahame advanced steadily to become secretary of the bank. At the same time he contributed story sketcl es about chifers to the value of Deserver and the 1el flow Book. His editors urged him to quit brinking for literature but I a preferred to write wite me the chose. He called himself a 'Eun lay writer working only on.

week ends His sketches were published in book form as The Golden Age (1895) and Dream Days (1899) They won the prace of critics

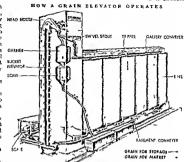
In 1899 (1898) I new won the parker of the and such lovers of books as Theodore Roosevelt

In 1899 Grahame marred Elepath Thomson and
the next year Alastair their only child was born
The Wind in the Willows was published in 1898

Grahame retire I from the bank in the same year and lived quietly on his country estate

Through the pages of The Ward in the Willows seminated with the group of characters—Tend Mole Badger and Water But. They are animals but they diese talk and hie idse human beings. Rich My Tood master of Tool Hall is the central character. He wants Travel (Change! Eventement! And his nerry pursuit of these pleasure leads him and his Irrephy into all norty of eleventements.

The Wind in the Willows is one of those rare books that can be rereal all through life Adults coming upon it for the first time encounter some of the finest writing in the English language and an ertistic subtlety of treatment One example is the chapter Wayfarers All in whilh Water Rat meets Sea Rat an l is so excited ly the talk of sh ps and foreign ports that he almost leaves his friends for a life at sea The reader forgetting the animal characters sees Water Rat as a young man yearning for the mystery and adventure of faraway places and for the moment identifies himself with Water Rat in these compelling dreams Grahame's power 1ke Lewis Carroll's lay in his ability to draw great truth from comic characters and abound a tuat ons Even adults thoroughly enjoy The Wand in the Willows



The truck boots gram from form fields to the gram alevator where the bucket alevator carries at to the gellery. The tripper distributes it to the storage bins. When marketed, the gram is logded may because by the bearment conveyer and the alevator.

GRAIN ELEVATORS A farmer in the United States may market be wheat corn cats or other grain by loading it on a truck and hauling it to a grain warehouse called a country eleuator. There he may either sell his crop to the elevator operator or he may store it for future sale.

From the country devator the grain is shipped to the large clearation at the central markets. There it is stored until time for shipment to mills or fore a markets. These commod devotors are towering steel and concrete structures. The word is largest grain elevator at Albany N. Y. holds about 13 million busheds. At the grain elevator the grain many be pioc eased by deaming driping weighing and bleaching. To issent the danger of dust explosions the dust is culted; and errored by suction pumps

The rapid expans on of wheat growing after the Civil War and the fack of storage facilities caused the railroads to build country elevators or to help pri vate conterns construct them They are owned by independent dealers in troads in ling companies or by co-operative associations Canada and the Un ted States have many elevators but most grain-exporting rountnes store and ship grais in sacks. The elevator method gives better protection against fire and vermin GRAMMAR The set of rules for the correct use of words to express thought is called grammar These rules have not been laid down by any one person They are the outgrowth of years of use by generations of people They are not artificial Good reason is behin I each of them because they enable us to give the elearest meaning to every word

## THE EIGHT PARTS OF SPEECH AND WHAT THEY DO

1. Noun. This is the "name" word. A noun is used for a person, a thing, a time, a place, or a state of being, ("Happiness," for example, is a "state of being ")

2 Pronoun. The word used instead of a noun, usually to avoid repetition. Instead of repeating the noun "Chicago," you can use the pronoun "it": instead of repeating "Americans," you can use "they"
3. Verb. Used to denote action or existence "Run"

is an action verb; "is" and "are" are existence verbs. 4. Adjective. The word used to describe a noun. "Man" is a noun "Good" is an adjective When put together, they describe a kind of man—a "good man"

5. Adverb. A word used to describe a verb, an adjective, preposition, or another adverb. An example of a verb is the word "read", "well" is an adverb, describing the verb "They read well"

6 Conjunction. This word is from the Latin, meaning "join together." A conjunction, such as "and," joins words together.

7. Preposition. This word is from the Latin, meaning "put before." A preposition, such as the word "in," is put before a noun or pronoun, usually to tell time or place Examples: "in the morning" and "in the house."

8 Interjection. This is a single word usually used to express strong feeling or to command attention. Examples: "Ouch" and "Help!"

The most common words in the English language are a, an, the. They are articles and are classed as adjectives.

Grammar makes elear what we say and write and what other people say and write to us. To speak and write grammatically is, moreover, the mark of a welleducated person. Most of us take pride in choosing the right word and using it eorreetly.

The English language has more than half a million words. This vast number, however, falls into eight general elasses-the eight parts of speech. They are: noun, pronoun, verb, adjective, adverb, conjunction, preposition, and interjection. They are shown in the accompanying table and are explained in detail in articles under their own titles in this encyclopedia.

The discussion of grammar in this article is aimed at showing you the general use of these parts of speech so that you may speak and write correctlyand interestingly.

Grammar Enables Us to Communicate Ideas

Far back in the history of man, people communieated their ideas by single words. Today we call such words interjections; and that is how babies speak when they are learning to talk. A baby may bump his head and say, "Hurt!" Unless we saw him bump his head, however, it might be hard to know what he had bumped.

As he learns more he makes his ideas elearer by putting words together. In speaking and writing we usually put words together in a phrase, a clause, or a sentence. A phrase is a group of two or more words that carries meaning, but lacks a subject and predicate—for example, "in glass houses." A clause is a group of words within a sentence, with a subject and predicate, as "who live in glass houses." A sentence is a group of words that tells a complete idea. It usually contains phrases or clauses, or both, as "People who live in glass houses have no right to throw stones" (see Sentence).

# How We Make a Sentence

When the baby learns to put words together, instead of only saying "Hurt!" he says, "Head hurts" The addition of a subject, in this ease "head." tells us elearly what hurts. The word "hurts" is the predicate.

Every sentence, no matter how short or how involved, must have these two parts-subject and predicate. The subject is the thing we talk about, such as "head." The predicate indicates what is said about it, as when the baby said, "hurts." Notice that, as used here, the word "hurts" is a verb. Every predicate must contain a verb. For an example of dividing a longer sentence into subject and predicate, take "The largest eity in the United States is New York." Here the subject is not one word, but several-it is, "The largest eity in the United States." The predicate is "is New York."

The two sentences studied here are simple sentenees. A simple sentence is one that tells a single faet, with one subject and one predicate. In the article Sentence you will learn how to make complex and compound sentences. Despite their names, they do not have to be puzzling or cumbersome. They are well worth studying, because they can give variety and liveliness to your speaking and writing.

In both speaking and writing, the sentence is your chief form of eommunicating with other people. When written or printed, sentences are easy to recognize, because each starts with a capital letter and ends with a period (.), or an interrogation, or question mark (?), or an exclamation point (!). (See also Punetuation.) In spoken English, the type of sentence is indicated by infleeting the voice—an even tone for a declarative, or "period," sentence; rising tone for a "question" sentence; a little burst of extra force for an evelamatory sentence.

When you do not use punctuation in written English, your meaning is seldom elear. Look at these words strung together: "I am going downtown to buy a pair of shoes they will have to be practical my mother says they must last until spring that is months away." They make much more sense when punctuation splits them into correct groups: "I am going downtown to buy a pair of shoes. They will have to be praetical. My mother says they must last until spring. That is months away."

Sometimes two or more sentences seem to have equal value. You may say, "I am tired. I stayed up too late." The first, however, is the result of the second and this meaning would be clear if you said, "I am tired because I stayed up too late." What seem to be two sentences are really clauses and are now correetly joined by the conjunction because.

Conjunctions also join words and phrases. The conjunction used most is the word and. There is danger in that handy but lazy word. People who talk or write carelessly use it too often, hitching all their ideas to

it. For example I awakened easily and get into my oldest journs and dign some to t and went fash ing and caught eight peech and eines beside gave them to mother and she wide due to element and she fried them for me and they certs and trasted fresh and crap. Each that aloud and you vi i probrishly not only get out of he with but you's il also have for contrast good of the liess.

The thought is much clearer and far less monifomous when you break a tip and use war ed words unch as pronouns and adject was Forevample. La valenced early and after getting into my oldest jetting the some but and went firshing. I caught eight per When I came home I gave them to mosther who sade me to clean them. She then if red them for us. They certainly taxted fresh and er w.

#### Diagramine a Sentence

You can study a sentence by disproming it—that is breaking it into its related parts. The example above as a diazem of a single declarative sentence—Good et zenship brings its own is varied. You see hear it is broken into subject vers and object to their mod first which are adject we and selvents as belied. Complete and compound evaluates earlied to the complete of the complete o

#### Usage Etymology and Syntax

The rules of grammar are avalive avour language itself for they change with usage. Shakespeare for example wrote the most unkindest cut of all which is a double superlitive To lay it is no longer correct. On the other hand many of the expressions that were considered ungrammat callonly a few years.

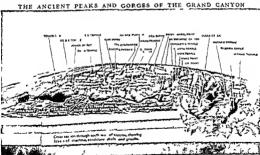
## Good at zensh p always brings its awn rewards

ctrzemh p	brings /	rewords			
(subject)	(va b)	(ob ect)			
Good	always	ts own			
(mod f a ) adject ve	(mod fa ) odra b	(mod f e s) ad ect vas			

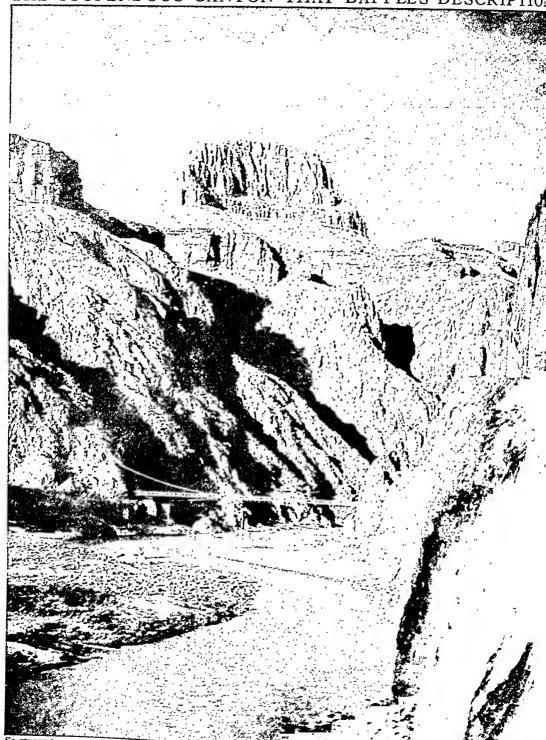
ago are no v acceptable to many grammarians because of their v de usage

An example of change n usage as the modern informal by an bisumess correspondence. The b sees letter of 1900 began something like this. Yours of the 12th mestant received and at contents duly note! Today such at 16 formal by se outsided. Informality has also accessed in conversal on reports the theater has also accessed in conversal on reports the theater expressions as 1 am and you do not are often contracted to I am and you do not are often contracted to I am and you do not.

The se ence of grammur computes to a large drucome-symmograpant syntars. Expunding via the comes from the Greek etymose (true) as the study of words especially their der vat on Syntar from the Greek syntaxes (put in order ) as the study of sentence structure (Ser die Language Arts Sigling) GRAND CANYON When you stand on the r m of the 21T mile gonge cut by the Cole ado River through the high pixteau of northern Ar sona you are over whelmed with a te-The Grand Canyon of the Colerado is the most spectacular canyon in the norld. It is natures greatest example of saultplaning



# THE STUPENDOUS CANYON THAT BAFFLES DESCRIPTION



So stupendous, so incredibly vast and magnificent, is the Grand Canyon, that, as one writer says, "It has swallowed all the words in the dictionary suitable for describing the impression it makes on the eye, and it still remains undescribed." Here we see how the tributaries of the Colorado have cut up the original mass into the "temples" and buttes. Some ledges are red, some yellow, some gray. Purples and blues and greens appear in certain lights. The effect is like a great broken rainbox.

Look across the yawning depths of the stupendous chasm to the opposite wall ablaze with bands of glowing colors Peer over the edge and far below you see what appears to be a tiny silver thread it is the swiftflowing Colorado, one of the large rivers of North America It looks so small because it is a mile below

you. At the top its canyon is 4 to 18 miles wide From the rim to the river a brink the walls descend in a succession of cliffs and terraces like a mant s staurcase each step several hundred feet high. The barren rocks of white buff dull red and green have been carved into a bewildering variety of forms-

buttes and pinnacles alcoves and Oriental temples crowned by battlements

The majesty of the Grand Canyon which Charles Dudley Warner called by far the most sublime of all earthly spectacles is accentuated by a myraid of a de gorges which join the main canyon from right and left. The region is a composite of hundreds and thousands of gorges Few have seen more than a tiny fraction of its wonders for the journey through the length of the gorge is made extremely hazardous by the many rapids in some of which the stream attains a velocity of 25 miles an hour The first man to go through the eanyon was Major J W Powell (1869) later Director of the Umted States Geologi al Survey, whose fascinating parrative of his explora tions remains one of the classics of American travel

Even the hardiest frontiersmen shunned the un known penis of enguling whulpools underground passages and grant falls which Indian legend attra buted to the canyon until Major Powell organized a party of ten to thread the gorge from end to end Hazardous enough the adventure proved though the underground channels and giant falls were found to be myths On the very day the journey ended just before Major Powell and the faithful few of his band emerge i into safety four men deserted hoping to scale the walls and were never heard from again

A reservation of 1 008 square miles along the nin of the Grand Canyon was set aside by the United States government in 1919 as one of the national parks In 1932 an additional 306 equare m les on the down stream side of the park were made a national monu ment A railroad spur and motor highways reach the canyon (For illustrations in color see National Parks ) GRAND RAPIDS, MICH When an American thinks of furniture he thinks of Grand Rap ds the furniture About 80 furniture capital of the United States factories are located there and the annual output is enormous While New York and Chicago exceed Grand Rapids in the volume of production of furns ture Grand Rapids is regarded as the leader in de ign finish and quality

Twice a year furniture buyers from all parts of the United States and even from abroad come to this city to inspect new styles and place orders These events have become so important that manufacturers from oti er cities also send their products to be displayed in huge expos tion buildings erected for their use

Bes des furniture making Grand Rapids has other important industries. Its factories produce automoble bodies and parts refrigerator cabinets school theater and church seats hardware plaster and other gypsum products baking and food products packed meat flour and soft drinks paper products and electronic devices It also has printing plants

Grand Rapids is the largest trading center of western Michigan and the second largest city in the state It is a tunted on the Grand River about 35 miles east. of Lake Michigan and near the center of the famous M chigan fruit belt and lake resort region

The city has followed a definite plan of development and is very attractive 1ts parks and playgrounds cover more than 1 000 acres. It is the seat of Agumas and Calvin colleges Grand Rapids Junior College and a branch of the University of Michigan Its umque and outstand ng Furniture Museum I as a fine

collect on of he tone and current pieces

In 1826 Laus Cumpan a trader became the first permanent white settler on the site of what is now Grand Rap ds In 1833 Samuel Dexter brought the first organized group of settlers from Herkimer County N Y The city was incorporated in 1850 It has a council manager form of government. Pot ulation (1950 census) 176 515

GRANITE. If you crush a piece of granite to powder. you can eas ly p ck out tany fragments of the separate substances or minerals that compose it One mineral is quartz. The particles often resemble smoky glass Another is feldspar You also see mica whose thin flat part cles reflect light like tiny murrors (See also Feldspar Mica Oparts)

The color of gramte depends on the proport ons and varieties of the minerals present. The prevailing

color is gray It is dark gray if dark minerals are abundant and light if they are few Greenish nink and blue hues are due to different kinds of feldspar Granite is an igneous rock. It was formed ages

ago wl en magma (molten rock) cooled This cooling took place below the earth a surface and clowly enough to permit formation of crystals. It has been formed in all the periods of geological time. It commonly occurs in mountain ranges having been formed as mountain ores But it also occurs in level regions which were mountainous at one time but have since been worn down (see also Rock)

Fresh granute is a very hard stone but like other rocks at may decay and crumble to pieces Because of its great hardness it is difficult to work, and so is an expensive building stone. It is used thefly as di measure stone for paying blocks curbing manuments an I have buildings where great strength durab lity and beauty of finish are required. Many varieties are very beautiful m color ag and take a high polish

The principal producing states of gran to used for dimension stone are Vermont Massachusetts Georgia So th Dakota and Minnesota. Other leading producers include Via ne. Wisconsin. North Carolina Oklahon a and South Carol on (See Quarrying)

# The HERO of APPOMATTOX in WAR and in PEACE

GRANT, GEN. ULYSSES S. (1822-1885). When the news that Fort Sumter had heen fired on was flashed over the wires in April 1861, meetings were

held in every city and village in the North, and volunteers by thousands offered their services in defense of the Union, even before President Lineoln issued his first call for troops. At a meeting in Galena, Ill., a middle-aged elerk in the hardware and leather store of Jesse Grant came forward and offered to help recruit a regiment. This man was Ulysses S. Grant, a graduate of West Point, who had served with distinction in the Mevican War and had resigned from the regular army with the rank of eaptain.

Born on April 27, 1822, in a little town, Point Pleasant, Ohio, the boy was named Hiram Ulysses. An error in his papers when he entered West Point Military Academy in 1839 dropped the Hiram and inserted Simpson, his mother's maiden name. He reported the error, but it was

never corrected, and eventually he adopted the name as changed. But his son, U. S. Grant, Jr., reports that the "S" was always written without a period, and that while it may have meant "Simpson," it was never so written.

Upon his graduation in 1843, Lieutenant Grant was sent to Jefferson Barraeks, Mo., and thence to the Mexican War, where he won two hrevets for bravery. In 1848 he married Julia B. Dent, the sister of a classmate, in St. Louis, and saw several years' service in the Far West in pioneer days. In 1854 he resigned and retired to a farm near St. Louis, later opening a real-estate office in the city. But in business Grant was a failure. He got into debt, and was glad to take a place as clerk in his father's store in Galena.

A Man of the Bull-Dog Breed

In May 1861, Grant was appointed colonel of the 21st Illinois Infantry, and in August he was made brigadier general of volunteers and given command of southwestern Missouri, with headquarters at Cairo. From the start Grant's policy showed the aggressiveness which marked his whole career. He at once took possession of Paducah, Ky. On November 1 he routed the Confederate garrison at Belmont, Mo., a result which ehecked the advance of a Confederate force under General Price. In Fehruary 1862, he captured Fort Henry on the Tennessee and Fort Donelson on the Cumherland. While he was besieging the latter, the commander of the fort, General Buckner, asked for terms of capitulation, to which General Grant



ULYSSES S. GRANT

replied: "No terms other than an unconditional and immediate surrender can be accepted." Buckner surrendered the fort with over 14,000 prisoners, and

Grant became famous as "Uneonditional Surrender" Grant This important victory brole the Confederate lines, and seeured Federal control of western Kentucky and Tennessee.

Grant was now made major general of volunteers and given eommand of western Tennes-ee On April 6, he fought the battle of Shiloh, one of the bloodiest engagements of the war. He was severely blamed by the people of the North for the heavy loss of life in this battle, and many demanded his removal from command. But President Lincoln steadily upheld him, saying, "I can't spare this man, he fights." During the summer ha fought the minor battles of Iula and Corinth, in Mississippi.

The Fall of Vicksburg

He then turned to the capture of Vieksburg, which would open the Mississippi River. His first

advance on the eity, poorly planned and complicated by political intrigues, proved a failure. But Grant remained in the neighborhood with his army, and after trying one plan after another without result his perseverance was at length rewarded. After a daring campaign, in which his generalship and his energy were more conspicuous than ever, he besieged the city. At the end of six weeks of blockade and heavy bombardment, this stronghold, with its garnson of 32,000 men, was forced to surrender on July 4, 1863 (see Vieksburg, Battle of).

Grant's next campaign was for the relief of Chattanooga, where the Federal army, beaten at Chicksmauga, was hesieged and practically cut off from supplies. On November 23 to 25 the hattles of Lookout Mountain and Missionary Ridge were fought, resulting in the defeat of the Confederates.

Takes Command of All Union Armies

In March 1864 Grant was made lieutenant general and placed in command of all the Union armies. He now planned a wide campaign which should press the Confederates simultaneously at all points east and west. Leaving Sherman to fight Johnston from Chattanooga to Atlanta, he himself with the Army of the Potomae confronted the Confederates under General Lee. The clash of these great leaders came in the terrible battles of the Wilderness, Spottsylvania, North Anna, and Cold Harbor. Finally came the siege of Petershurg, which ended in its fall, the capture of Richmond, and the surrender of Lee at Appomat-

GRANT S ADMINISTRATIONS

Treaty to samex Dominican Republic

defeated (1369)

15th Amendment ratified (1870)

Last of seceded states restored (4870)

Alabama' Claims referred to arbitration (1871)

Amnesty Act for ex-Confederates passed (1872)

Great fires in Chicago (1871) and

Boston (1872).

Panic of 1873.

Bill to increase paper money vetoed (1873)

"Salary Grab" raises Congressmen's

salaries (1873)

Postal cards first issued (1873)

"Whisky Ring" scandal exposed (1874)

Custer Indian Massacre (1876).

Colorado admitted (1876)

Centennial Exposition at Philadelphia (1876)

Disputed Hayes-Tilden Election of 1876

1869-1877

tox, April 9, 1865 Grant's generous terms of surrender and his courteous treatment of his late foe won the heart of the South At a later time he even threatened to resign his command if President Johnson had Lee tred for treason

The war was over Grant went immediately to Washington to histen the disbanding of the army

He was made a full general, the first to hold this rank in the United States Army, and was hailed as 'the man of destiny' and 'the nation' delivere' 'As such, he was elected presulent in 1850 on the Republican ticket, with Schuyler Collar of India ana as 'toe presidential candidate, against Gov Horatio Seymour of New York the Democratic can.

dudate
"The man on horseback" is not always a successful executive General
Grant's inexperience in
civil administration was
conceded and his lack of
political ability was soon
to be shown But his
strong will was known and
sleo his rugged patriotium

elso har rugged patrictism. He possessed the confidence of the people and this was necreased by the negotiation of the Washington freety with Eogland, which defined the righte and dithes of neutral nations in time of war and arranged the arbitration of the Alaboma elaims. His attempts failed, Lonewry, to bring about the annexation of the Dominaca Re-

public to the United States

The most important domestic problem of Grant's administration was the completion of the reconstruction of the South and the adoption of the 15th

amendment In 1872 President Grant was overwhelmingly reclected, with Henry Wilson of Massachusetts as his running mate in spite of the opposition candi dacy of Horace Greeley, the noted editor of the New York Tribune, who ran on a Liberal Republican platform At the beginning of his second administration Grant had to face the financial crisis of '73 Here he rendered an mestimable service to the country by vetoing a bill for issuing more "greenbuck' paper money, and by recommending that the government "resume specie payments by redeeming its greenbacks in gold The comage bill passed the same year was later denounced as the ocrane of 1873," because, by dropping the silver dollar from the list of standard silver cours, it "demonetized silver" His policy, however, was unquestionably in line with the best interests of the country.

The last years of Grant's presidency covered the loomet ble ever reached in the political life of the country. High public officials allowed contractors to cheat the government out of millions of dollars and profited by photes. Scandial gree out of government and to the Union Pacific Railway, and the phrases "credit mobalete," "whatkey ring" and 'star route."

became synonyms for dahonsety. In all the political control of the political control of the political control of the political control of personal distonesty. He fault lay in trusting those unworthy of trust and in trying to protect his friends. He was succeeded as president in 1877 by Rutherford B Hayes who had beaten the Democratic eandriate, Samuel J Til den in a disspated election.

in 1876 (see Hayes)
In 1877 siter his reture
ment from the presidency
Grant made his famous
tous of the world in which
Occident and Orient com
peted to do him honor
The attempt to eccure for
Grant the Republican

nomination in 1850 for a third term failed in spite of afrenuous efforts put forth by the 'stalwart' Republicans

At the sace of 66, a man of established fame Grant and wested has explain in the backing firm of Grant and Ward, New York City. With has usual trust in his accessates and his signomes of business, General Grant left the conduct of the enterprise to his partners, who proved do-honest. Through their dishonestly the firm failed, and Grant was left penniles. A fall had explosed the conduction of the conductio

he had to use a crutch

Nothing in all Grant searcer was so herone as the last year of the life Barkupyi, empleid and dying of center of the tongue he dictated two volumes of Memorit of provide for his family I vern thought it was atter agony to speak, he continued his task. That courses and tenestry recalled his famous dispatch ent May 11, 1884 in the battle of Spotsylvanin Court House—I purpose to fight it out this home of it takes all summer? As then, Grant pleid to the line" until the familet his body, only four days before he deed at hit McGregor, near Star. togs, Synney, N Y, July 23, 1885. The 'Memoris were a great financial success and their straightforward clear style great sham literary ment.

The magnificent tomh erected to Grant's memory in Riverside Park, New York City, is the tribute of a grateful nation. It honors him as the man whose miltary suctories were the key to preserving the Union

GRAPEFRUIT. Until late in the 19th century the few people in the United States who had grapefruit trees grew them only as ornaments. They let the handsome vellow ripe fruit fall to the ground and rot. Today grapefruit, or its refreshing juice, is served throughout the world—from breakfasts to banquets.

Raising and processing grapefruit is a huge industry in southern Florida, Arizona, and the Rio Grande valley of Texas. Southern California also has many groves of this popular citrus fruit. The United States is the world's largest producer. Other large growers are Puerto Rico, Cuba, Jamaica, Mexico, Brazil. South Africa, and Israel.

Grapefruit (also called pomelo) is so named because the fruit grows in grapelike clusters of from 3 to 18. The popular varieties are about twice the

ON THEIR WAY TO YOUR TABLE



Grapefruit is picked by hand in even the largest groves, for it must be handled gently to avoid bruises and scratches.

size of a large orange. The tree can rise to about 50 feet, but in groves it is topped at 15 to 25 feet and usually has three or four main limbs. The dark, glossy leaves are downy white beneath, and the large blossoms are sweet-scented (for illustration in color, see Fruit). Grapefruit trees are usually started by grafting budwood on sour-orange stock.

The trees bear in six or seven years. Some mature trees, such as Thompson pinks, may yield 1,500 pounds of fruit a season, but the average is 300 pounds. Trees begin blossoming from February to May, ripening in about eight months. In Florida, grapefruit must pass state maturity tests before shipment, which begins about October 15. Early season "matures" with greenish rinds are gassed to bring out the yellow color. Popular early varieties are Duncan and Foster; midseason, Royal; late, Marsh seedless and Thompson pinks. The pink-fleshed grapefruit was accidentally discovered in 1913 as a sport of the Marsh seedless. Selective breeding developed it for market by 1937.

Grapefruit is eaten raw or broiled. Great quantities are peeled, the segments being canned for salads and appetizers. The juice is canned or frozen; and rind, seeds, and "rag" (the core and fibrous tissue between segments) are ground for animal feed or pressed into flavoring oil, largely for soft drinks, Grapefruit has few calories and much vitamin C.

Horticulturists long thought that grapefruit was of the same species of the citrus family as the shaddock (or pummelo), a native of Malaya and the South Sea islands. The shaddock is a coarse, bitter, pearshaped fruit, weighing from 10 to 20 pounds, supposedly brought to the West Indies by a sea captain named Shaddock. Now authorities say grapefruit is a distinct species, Citrus paradisi, probably developed as a seedling sport in the West Indies.

It was probably introduced into Florida about 1809. Late in the 19th century winter visitors tried the fruit and liked it so much that Floridans planted groves and began northern shipments in the 1880's.

grapefruit was passed through steam, then peeled by hand

To remove the outer rind, the



and removes the membranes.

## GRAPES-Most Widely GROWN FRUIT in the WORLD



Graphs. When Leif Ene on landed in America in An 1000 he was no struck by the al undance of hid grapes that he called the land Vinhard we hard. There are mr re t as a 60 known spec es of with rappes and more time in that destination to 6 the hard with the contract of th

w) or cert of the United States grapes
Commerce all grape growing in the United States
started on the eastern seabcard The early colonists
had brought grapeving cuttings from Europe and
planted them carefully but all died Later Ameri
cans experimented with native wild grapes. Some
growers had good success with the for gripe species
I all obruse. In 1809 Thomas defferson wrote I

think it will be well to push the culture of this grape without losing time and effort in the search of foreign varieties which it will take centuries to adapt to our

so l and el mate

Jefferson as a right about grape growing in the Daterin United State: Today almost all the grapes grown in all the states east of the Rocky Mounta come from careful development of the for grape About three fourths of those produced are Concord Repress This plump his curple type is a table jelly and ju ce grape. It is not stated for wine making How the Concord Became a Great Curp

Chunce physed alongs per Concord Mars pecked with the Marshall and the Concord Mars pecked will be the Marshall and the Marsh

the market in 1849 Concords are hardy, bear heat by and upon well in the North

Two old expopular varieties of the for grape species are the green Ningara and the red Catawab. D scovered near the Catawab River in North Carolina in 1802 and introduced by John Adlum in 1823 the Catawab became a table and will egrape especially good for champagne.

Other Principal Native Species

Of the more than is no assen species of wide surpen in the United States only three beingles the for grape have contributed much to grape growing. The first is a centraling or aummer grape. From it comes the staall sweet red Delware grape which is second only to the C need at layer. From the species I was prosecones the latesty dark Clinton. Its feat prosecones the latesty dark Clinton. Its feat the Clinton's chief values are its vigen and its resistance to disease. Many covers use

its stock for grafting at the but weaker types. The third major species is be rotund/folia the muscadine grapes cultivated in the deep South. The best-known variety is the jellow-green thick skinned Scupper none which has a diumlike taste

Grape groung a cities that there is more than the Lat n cuts (too) and the bength cutture. Growers or viscoiltures is have developed about 1000 varieties of grapes in the United States and are constantly adding variations. The dist neture colors of grapes are in the outer skin. They range from pale green or vision to red out the black and were varieties.

Cal fornia's unsyarda Lead the Nation Great uneaparda ramy of them ir graded spread over the coastal and interior valleys of California Grapes are securelly the third most valuable erop in the state. California's grape of time leagen in a similal of 1 size surgice at the leading of 1 size surgice at the leading of 1 size surgice the Oild World grape about 1750 Il is not the species it at failed in the eastern satboard coloness destroyed by chill worters family and the moster peet called phyllozern. It thrived however in California smill in where said they growing easten. As opened varieties of the Oild World grapes from Europe and also developed ne voines.

The Ol World gapes have a meat er pulp than the matree species of the Eastern Untel States and no are better for rareas including the dired currents. Among the Old World table gapes in California are the anaber Thompson Seedles; the errly Rel Mainer and the Finne Tokay—the first sealing large The chief California wine gropes include the Biol Zimfand the Sinne Tokay—the first sealing large Month of the State of the Sta

New World Stock Saves Old World Grapes
In the 19th century growers in France experimented
with cuttings from native American species In 1860

## AT WORK IN MODERN NORTH AMERICAN VINEYARDS





These trellised vines are widely spaced to permit passage of the pick-up truck. A converer rolls the boxes up onto it. Old European terraced vineyards are too crowded for mechaniza-

tion. At right, a vineyard worker sprays vines against insert pests. Grape growing requires more expert care than more other crops. The soft, well-drained soil is good for grapes.

some of the imported cuttings carried the grape phyllovera the aphid that had destroy ed all the Old World vines in early America. By 1888 the whole French grape industry was threatened with destruction. After many futile measures, the scourge was checked by introducing whole vines from America, as they had become immune to phyllovera through centuries of attack. France's famed varieties of Old World grapes now grow, unchanged, grafted on American roots. Some growers in other nations also follow this practice.

Grape growing is the largest world-wide fruit industry. France leads all nations, followed by Italy, Spain. the United States, Argentina, and Portugal. California grows 90 per cent of the United States grapes. usually 2,500,000 to 2,800,000 tons—about 10 per cent of the world crop. New York follows with 50.000 to 74.000 tons yearly. Other chief producing states are Michigan, Pennsylvania, and Washington. Every state in the nation grows some grapes.

How Grapes Are Grown

Grape culture is one of man's oldest arts. Grape seeds have been found with mummies in Egyptian tombs at least 3,000 years old. Vines grow in many soils and climates, but they thrive best in sandy, welldrained loams and warm, sunny locations. They are rarely grown from seeds. A common method of propagation is to plant cuttings (sections of branches) from mature vines. Another method is layering. This is done by bending down a lower branch of a mature vine and forcing the branch to grow along a shallow trench in the ground. After shoots start to grow upward from buds on the branch, the trench is filled with earth. The shoots then develop roots. By fall or winter the shoots are ready to be cut, roots and all, from the parent branch and can be planted in the spring as new grape vines.

Sometimes grapes are propagated by grafting cuttings on rootstocks of vines. As the vines develop, they are pruned regularly to insure a quantity of high quality fruit. Pruning frees them of diseased branches, such as those afflicted with black rot. Pruning is also needed to train the vines to grow on

upright stakes and then on trellises. In California many growers train the vines on stakes only, and so their vineyards are free of trellises and can be cultivated crosswise as well as lengthwise.

Vines require periodic spraying against insect peris and disease. The vines repay good care; some re-

main fruitful for 300 or 400 years.

Fermented grape juice makes wine. Fermenting raises a gravish or reddish crust in the vat. This crust is a crystalline substance called argol. When refined argol becomes the cream of tartar used in medicare and baking powders. Unfermented grape juice is made from Concords. Grapes are rich in sugar and a source of vitamin B and iron. (See also Currents) GRAPHITE. When you make a mark with the "lead" of a pencil, you are putting on paper tiny crystals of graphite. This soft. slippery mineral (also called "black lead" and "plumbago") is an allotropic form of carbon (see Carbon; Pencils). Graphite makes an excellent lubricant, because its multitude of cristals readily adhere to rough metal, producing a smooth surface and reducing friction. The chief use of graphite, however, is in foundries, where it gives \$ smooth facing (lining) to sand molds in which metal castings are made. Much is used also for crucibles, because it withstands terrific heat; and for electrotyping and electrical apparatus, because it is a good conductor of electricity. Another important use is in paints.

Graphite of high purity is artificially made from anthracite waste in electric furnaces at Niagara Falls, N. Y. Artificial graphite is also made in Canada and other countries. Most of the mined graphite comes from Korea, Ceylon, Madagascar, Germany, Czechoslovakia, Austria, Russia, Italy, and Mexico.

The United States has much graphite, but mines relatively little because the deposits are low grade. Colorado, Michigan, Nevada, and Rhode Island have "amorphous," or soft, graphite; crystalline graphite occurs in Alabama, Alaska. California, New York. Pennsylvania, and Tevas. The United States imports more than it produces of both natural forms.

## How to MAKE and READ GRAPHS and CHARTS

CRAPIES Most people find it helf relit to make meaningful companions between numbers. They find it expectably difficult if the numbers are large out there are many of them as an large out there are many of them as most activate tables. Granhs and charts make it easy to compare quantice because they show the relation hape with diminatic sample ty. Deen of fastatictum an accurate graph and fastatic than a security graph of the companion of the co

The use of graphs and charte is con stantly increasing. In books magazines and newspapers we frequently see bar charts pie charts line graphs

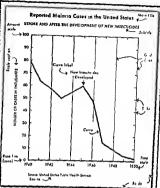
and pictorial charts. The common types of charts are here illustrated in simple form. While each type has the purpose, there is usually a choice of several ways to

chart a given set of statistical data
Materials and Tools for Chart Makine

Paper For the working drwangs time can be savel and accuracy gained by using printel graph paper. Graph paper is usually available with square rided in questier fifths or tenths of an inch 5 neet he waits used for chorts usually follow the deemad spore agraph paper rided in textus of an one's some graph paper rided in textus of an one's some agraph paper rided in textus of an one's some graph paper and in the rided and in the contract of the save and the s

Tools The tools used for reaking charts are the same as those used for mechanical drawing—admaning board or table. It square triangle protractor order and ruling pen. For pretures of these tools and nurier tools on how to use them see the stretch Drawing depecial protractors are made for chart work that divide the crede into 100 parts materal of 300° and others can be obtained that drivide the men indices can be obtained that drivide the men tool tentla). The chart maker should also have accessor fine bruckes a hard lead pencil for plotting Indias ask a jum eraser rubber cement and red blue and green pencils.

Lettering and Color To letter by hand (see Drawing) straple block capitals should be used Individual



cutout letters and numerals with gummed backs can be purchased in various sizes. Color can be put on the finished drawing with colored inks or raints or by pasting on colored paper. For har charts and for large broken line graphs colored tape with a gummed back may be used.

How to Construct a Simple Chart

The first step is to study the statistical data to decide what are the significant features. For example to the data show a treal over a period of time or do they show the relations of absolute quantities at a particular point in time? Next select the type of clear that will show the escential relatives accurately distributed to the second properties. The second base and proportions which is a second properties and lake of firemat rough sketching on graph paper before selecting the first clear.

Title The title should be at the top centered between the border lines if there is a border. The main title should tell welly what the chart is about. A subtitle and explanatory notes may be added for clearer understanding

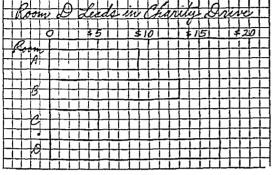
Source The source of the data should be stated The usual place is the lower left-hand corner

Grid The grid should show equal units of 1, 2 5 10 25 or some multiple of 10. The size of the unit depends upon the degree of accuracy required in read

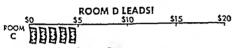
depends upon the degree of accuracy required in reading the chart. When spaced too close the grid detracts attention from the curves or bars. No more

# Simple Comparisons of Size

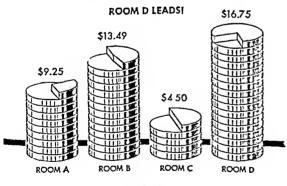
ROOM	THUOMA	ROUNDED	ROOM	ТИПОМУ	ROUNDED		
Α	\$9.25	\$9.00-	С	\$4.50	\$5.00		
В	\$13.49	\$13.00	D	\$16.75	\$17.00		



1. A horizontal bar chart



2. A pictorial unit bar chart



3. A pictorial column chart

lines should be shown therefore than are necessary to guide the eye. On small charts, ticks may sometimes be used instead of lines. For very simple bar charts, the grid on which the chart was constructed may be omitted in the finished drawing.

Weight of Lines. The lightest lines are the lines of the grid. The base line (zero) should be heavier than the other grid lines. The other outside lines are sometimes emphasized slightly. The heaviest lines should be the curves. If there is more than one curve, the lines must be distinguished by color or by various types of dotted and broken lines.

The Key. A key is sometimes needed to identify the curves or bars. It may be placed on the grid (usually in the upper left-hand corner) or below the title. Labels may be used instead of a key to identify two or more curves or bars. A label—usually with an arrow—may be used also to call attention to some significant point on a curve.

Scales. In the typical chart, the amount scale is vertical, with the smallest quantity (usually zero) at the base line. The amount scale caption states the unit used in the scale, such as "Dollars" or "Tons." The scale should be simple, with as few zeros as possible. An amount scale with figures from 1 to 6 is easier to read than one progressing from 1,000,000 to 6,000,000. The omission of the zeros must be indecated in the amount scale caption by some phrase such as "Millions of Dollars" or "Population (in Millions)."

If the chart shows a time series, the time scale is usually at the bottom, and the earliest time is at the left. The time scale designations—years, months, or hours—should be directly under the points where the data are plotted. If the data are plotted on the lines the designations are placed directly under the lines. If the data are plotted between the lines, the designations are placed between the lines.

Simple Comparisons of Size

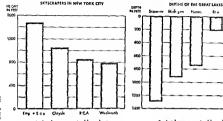
It is much easier to compare lengths of bars than it is to compare areas, such as squares or circles, or to compare volumes, such as cubes or pictures. Horizontal bars are therefore much used to show simple comparisons of different quantities.

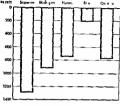
Suppose a student wants to make a chart that will show graphically the records made by various rooms in his school in collecting money for a community charity. He would first make a statistical table his that at the top of this page showing the actual amounts collected; then he would round off the amounts. Notice that in rounding \$4.50 becomes \$5.00 and \$13.49 drops to \$13.00. The highest amount, in round numbers, is \$17.00. The amount scale therefore need run no higher than \$20.00.

Chart 1 is a working drawing, on graph paper, for a horizontal bar chart. The bars could have been placed in order of size, with the longest bar at the top instead of in alphabetical order. With alphabetical order, the room letters may be more quickly located. The spacing between the bars should be not more than half the width of the bars. Vertical grid lines may be omitted.

In Chart 2 the horizontal bars are rows of symbols. Each symbol represents one dollar. In Chart 3 stacks of coins take the place of horizontal bars. Notice that a part of a symbol is used to indicate an amount less than \$1.00. Since the labels show the actual amounts collected by the different rooms, the amount scale is omitted. (For other examples of pictorial charts in bar form, see Food; Russia; United States.)

## Simple Compansons of Size





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4 A column or vertical bar chart

A column or vertical bar chart

It seems natural to u e vert cal rather than hor zontal bars to show he ghts of buildings and let the of lakes. In Chart 4 the bars extend upward from the base line zero. In Chart 5 the bars extend do n vard from the bare ine to show depth. In Chart 4 com para one are made easier by showing the heights of the build ngs in descending order. In Clart 5 the order of the bara corresponds to the geographical locat on of the lakes from west to east. Compare this chart with that in the article Great Lakes

100 Per Cent Bar Charts and Circle Graphs Somet mes it is desirable to base a chart on per entages rather than on absolute amounts. For this purpose circles or hars are usually use! The ent re

c rele or h r represents 100 per cent (see Percentage) A student took an on mon poll in his . hool to find out lov many (hillren expected to atten la certa n school play Of the 50 children interviewed as a sam

ple 30 ad yes 15 sail no and 5 were undee ded. The results of the opinion poll can be slove. as ner entages by bar charts or by a circle graph (also called a pie chart) For the har harts at is necessary only to find what percentage of the total vote; yes what percentage voted no and what percentage was undecided. Then the segments are laid off on the har scale a order of size. For the circle graph the percentages hale to be converted into degrees in order to d vale the circle into segments. (The number of degrees in a circle is 300 ).

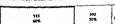
Chart I sho vs the results of the poll as a 100 per cent rectangle or component bar chart Grid Ines are unnecessary because each segment, a labele i and the percentage it represents a indicated. In Chart 2 the har is I v le I nto three parts (For other examples of the 100 per cent bar chart see Air Sifety are also the fact Summary for each state )

## 100% Bar and Circle Charts

	Child en	of To e	Day out		
Yes No	30 15	60 30	276 108 36		
Unde ded	5	100	360		
To al	50	100			

100 anse off 2 Adv ded bar chart

HOW MANY STUDENTS WILL AFTEND THE SCHOOL PLAYS



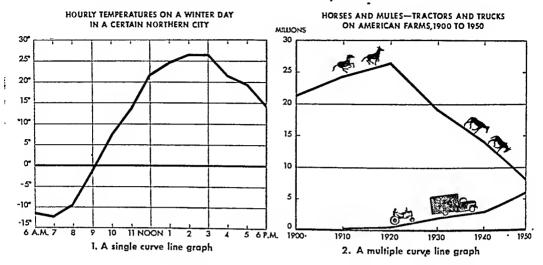




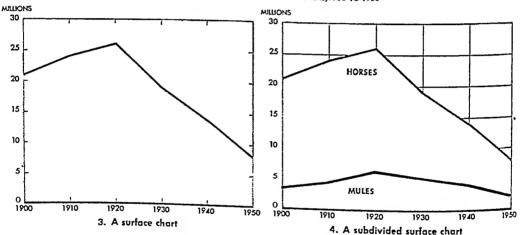
1 A reclangle or component har chart

3 A c rele graph as pecha 1

# Time Series Line Graphs



# HORSES AND MULES ON AMERICAN FARMS, 1900 TO 1950



Diagrams A and B show the steps in making a circle graph. We first draw a circle, with a compass, of the size we want. From the center of the circle we draw a line to the circumference. This line is a radius. We lay the base of the protractor along this radius, mark on the circumference an angle of 36°, and draw another radius. Then we lay the protractor base line along the radius just drawn and measure off an angle of 108°. The sector remaining should measure 216°. The circumference of the circle (360°) represents 100 per cent, just as the bar does.

Time-Series Line Graphs

The charts so far presented show numerical values of different items at the same point in time. One of the most important uses of charts is to show changes over a period of time. Both curves and bars are used for this purpose. When the emphasis is on movement,

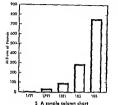
the line graph is usually preferred because a curve moving across the face of the grid gives a quick picture of a trend.

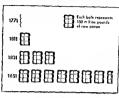
The time scale is laid out across the bottom. The amount scale is usually at the left but may be placed at the right if the chief interest is the amount at the latest date, as in graphs showing stock market prices. If the grid is wide the amount scale should appear on both sides.

In Graph 1 the amount scale does not begin with zero because temperatures both above and below zero are recorded. To emphasize the zero line, it is made heavier than the other lines on the grid. The time-scale designations are placed directly beneath the vertical lines, rather than between them, because the temperature readings were taken exactly on the hour and do not represent the average for the hour. The

### Time Somes Bor Charts

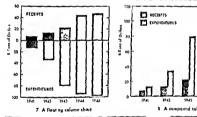
## IMPORTS OF RAW COTTON INTO GREAT BRITA IN DURING THE INDUSTRIAL REVOLUTION





A p storiel un t bar chart

RECEIPTS AND EXPENDITURES OF THE UNITED STATES COVERNMENT DURING THE WAR YEARS 1941 45



A compound column short

points are plotted directly above the time-scale designations and then connected with straight lines

In Graph 2 two curses are shown on the same grid Comparison of the two curves makes clear that the horse and mule populat on declined as the number of tractors and trucks mereased On this graph pictorial symbols take the place of curve libels

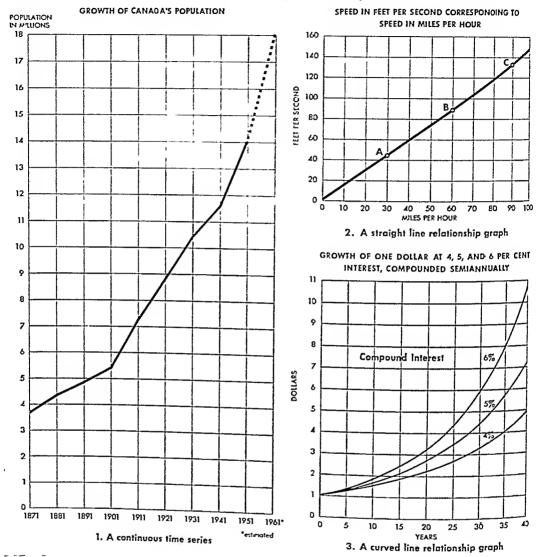
In Chart 3 the curve is emphasized by shading the area beneath it. In Chart 4 the divided surface separates the horse and mule populations

Time Series Bar Charts A limited number of changes over a period of time can sometimes be shown more clearly and dramats cally by a bar chart than by a line graph Vertical columns are preferred to horizontal bars when time is involved. As in the line graph the time scale should be at the bottom Usually the vertical grid is omitted. The horizontal grid may be eliminated also if a general trend is to be emphasized rather than particular amounts

When a time series is shown in pictorial form horizontal rows of symbols are usually preferred to vertical piles The time scale is then moved to the left with the earliest time at the top Chart 6 shows in pictorial units the same general data as Chart 5 (For other examples of time-series pictorial charts see Health Land Use United States )

Sometimes it is desirable to use two or more sets of bars on the same chart to compare two or more series of related data Charts 7 and 8 show two ways of contrasting receipts and expenditures Chart 7 is a floating column chart so called because the zero line floats and a second amount scale runs down from it Chart 8 is a compound column chart A

# Curved and Straight Line Graphs



double bar, in two colors, contrasts receipts and expenditures for each year.

It is easier to compare year-by-year receipts or vear-by-year expenditures with Chart 7. However, it is easier to compare receipts and expenditures for each of the given years with Chart 8.

# Curved and Straight Line Graphs

Continuous Time Series. The line graph is preferred to the bar chart when many large numbers are to be plotted and the data are continuous—that is, when there are no breaks in the series repre-(For an explanation of continuous and sented. "discrete" data, see Statistics). In Graph 1, "Growth of Canada's Population," the rise of the curve shows the trend at a glance. (See United States for a similar population line graph.)

Graphs of Relationship. It is sometimes desirable to show in graphic form the relationship between two sets of associated data. If the relationship is perfect. the line connecting the plotted points will be a straight line, as in Graph 2, or a smooth curve, as in Graph 3.

There is a perfect relationship between speed in feet per second and in miles per hour. To plot this graph we figured that the speed at 30 miles an hour would be 44 feet per second. Sixty miles would be 88 feet and 90 miles would be 132 feet. We first placed a point at A on the grid line running down to 30 and across to 44. Then we located point B

and drew a straight line through the two points. To check the line we located point C. If the line had not run through C. we would know a mistake had been made.

Graph 3 shows the relations of three different curves to one another (For a graph showing the relation of simple interest to compound interest see Percentage and Interest)

#### Simple Frequency Distribution

In order to plot so, statestical data the numbers must first be arranged in some systemate order. We have seen that for time-series graphs the data are distributed according to time of occurrence. For some types of data—such as measurements of height weight or source—the time element does not enter. In or fet to plot such data it is advisable to find out how free to plot such data it is advisable to find out how free to plot such data it is advisable to find out how free to plot such data it is advisable to find out how free to plot such data it is advisable to find out how free to plot such data it is advisable to find plot for the plot of the cample impire to bisolated around the such as a property databouts and the cample of the data is a property of a company of the data in the cample in the data is a property of a subject to 53 punds. The

test consists of 50 specimen are associated according to the number of 10 specimen are associated according to the number of 10 specimen are associated as a specimen are as a specimen as a specimen are as a specimen as a speci

classes occur (See also Statustics)

Histogram Chart 1 is called a histogram a column
diagram or a rectangular frequency polygon. The

horizontal scale shows the measurements represented in order of size. The first interval on the horizontal scale is used to indicate the first class interval. Since no pupil made a score below 10 the scale begins with 10-14 inclusive. The vertical scale like the

usual amount scale begins with zero

To plot the chart a horizontal line is drawn

acros each class interval at the proper height on the sertical or frequency each 'The result is a server of connected columns one for each class in server of connected columns one for each class in textal in the table. The number of occurrences (frequences) in each interval is shown by the beight of the column. In form the histogram resembles the vert cal bur chart since lengths of columns are compared. However in the histogram there is no spacing between the columns because there are no breaks in the series

Prequency Polygon Any data represented by a histogram can be represented also by a hing graph as a frequency polygon. The same frequency table for the spelling test scores used to plot Graph 1 was use I for Graph 2.

To plot the frequency polygon we assume that the stores are distributed evenly throughout each ches interval. On the horizontal scale the lower limit of one group is used as the upper limit of the pre-

Simple Frequency Distribution

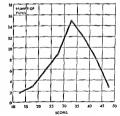
Class Interval	Tally	Number of Scores		
45.49 49.44 35.39 30.34 23.29 20.24 15.19 10.14	## ## ## ## ## ## ## ## ## ## ## ##	3 8 12 15 9 6 3		

SCORES MADE BY 58 PUPILS ON A



0 10 14 13 19 20 24 23 29 30 34 35 39 40 44 43

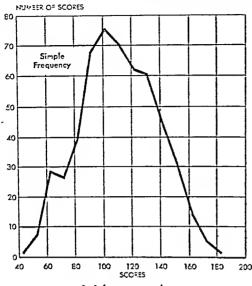
1 A histogram

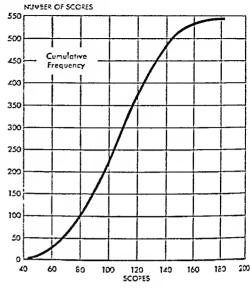


2 A frequency polygon

# Simple and Cumulative Frequency Distributions

SCORES MADE BY \$44 PUPILS ON A GROUP INTELLIGENCE TEST





1. A frequency polygon

2. An ogive

Interval	20-29	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-187
Simple Frequency	2	8	29	27	40	68	76	71	63	61	45	31	15	6	2
Cumulative Frequency	2	10	39	66	106	174	250	321	384	245	490	521	536	542	511

vious group. Points are plotted, at the proper heights, at the mid-point of each interval. For example, to show the scores in the 10-15 interval, a dot is placed at 12½, halfway between 10 and 15 and opposite 2 on the vertical scale. To show the 3 scores in the next interval, a dot was placed above 17½ (mid-point of the 15-20 interval) and midway between 2 and 4 on the vertical scale. When all the dots had been placed, they were connected with straight lines. (For other examples of charts showing frequency distributions, see Statistics; Intelligence Tests; Individual Differences.)

# Simple and Cumulative Frequency Distributions

The frequency table for Graphs 1 and 2 shows the distribution of scores made by 544 students on a group intelligence test. Notice that the scores are tabulated by frequency of occurrence in the first row and are cumulated in the second row. A cumulative frequency series is compiled by adding the successive simple frequencies for each interval so that each number in the cumulative series includes all the preceding numbers.

Graph 1 is a frequency polygon. It was plotted from the first row of the table. Graph 2, plotted from the bottom row, is an ogive. Cumulation of data tends to smooth fluctuations of a curve. Notice

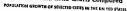
that the curve runs diagonally across the grid in the form of an S. This S curve is characteristic of the ogive.

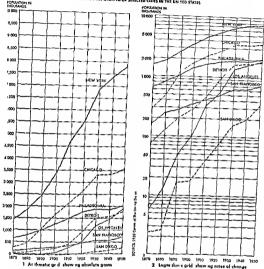
The Ratio Chart with Logarithmic Rulings

Suppose that the population of a town of 6,000 increases in ten years to 6,600. The absolute growth can be expressed by the statement, "Our town has 600 more people than it had ten years ago." If, however, we want to express its rate of growth relative to its former size, we would say "Our town's population has increased 10 per cent in ten years." If another town increases from 12,000 to 12,600 in the same period, the absolute growth of the two towns is the same, but the relative growth of the second town is only 5 per cent. Thus the rate of change, or percentage increase, depends not only upon the amount of change but also on the base amount.

Charts 1 and 2 (on the opposite page) show the growth of seven eities in the United States—the five largest, and two others (San Francisco and San Diego) chosen for purposes of comparison. Chart 1 shows absolute growth and Chart 2 shows rate of growth. Both charts have the same time scale and the same vertical grid lines, and both have an amount scale running to 10,000 thousands. The difference between the two charts is in the horizontal grid lines.

# Arithmetic and Ratio Charts Compared





On Chart 1 the spaces between the homosules for d lines are equal again direct equal quantities. This type of scaling is called an orthweste grid. On Chart 2 the homosuntiat grid has are not equally read to trulled to represent percentage changes that the contract of the properties of the chart 2 the homosules are designed as called a logarithmer grid. As that the change of the scales Charts with both homosuntial and vertical log rullings are trucommon

The absolute difference between 10 and 1 is 9 and the absolute difference between 100 and 10 is 90 However 10 has the same ratio to 1 that 100 has to 10—the rat o of 10 to 1—on the logarithmic or ratio scale 1 and 10 are the same distance apart as 10

and 100. The distance on the scale between 10 000 and 1 000 is also the same as the distance between 10 and 1 because 10 000 has the same ratio to 1 000 that 10 has to 1.

Equal distances on the log scale always represent equal percentage changes. For example, if there is an increase of 10 per cent in one period in the oppulations of two cites both curves will rise an equal distance although one city may be large and another small. The two curves will be prafiled lines.

If we look at the chart with the arithmet o grid we might get the impress on that New York City grew more rap diy than San Dego Chart 2 shows very clearly that San Dego grew at a faster rate

In addition to studying relative or percentage changes, logarithmic charts are used to compare two series that differ widely in amount. Suppose we wanted to compare the population growth of San Diego with the population growth of the United States as a whole from 1870 to 1950. An arithmetic grid could not be used because the curve showing the population growth of San Diego would appear as a relatively straight line (below 4 million) as compared with the steep rise of the United States curve. A semilogarithmic grid would show that the population of San Diego actually increased very much faster than the population of the United States in this period. (See United States for arithmetic and ratio charts showing rise of population of the country as a whole: see also Powers and Roots; Logarithms: and Logarithms in FACT-INDEX.

## Statistical Maps

Statistical maps compare quantities, like other charts, and at the same time indicate the location of the quantities. Plain outline maps, without mountains and rivers or state and city names, are generally used for charting.

Relative quantities of the same item may be shown in a variety of ways. On shaded black and white maps, black usually represents the largest quantity and white indicates the absence of the item studied. Between black and white, various shadings or cross-hatchings, explained by a key, show the relative importance of the quantity groups. Different shadings in color or different colors are also used. (For examples, see Population; United States (Population Density by Counties); World (Population); see also Rainfall.)

Dots may be used instead of shading to show varying quantities. Each dot represents a fixed quantity. When circles of different sizes are used, each size represents a different quantity. When the dots are of the same size, they are crowded close together in the areas of greatest density. (See maps in the article United States showing areas producing corn, wheat, oats, hogs, and cattle.) Small bar charts are sometimes placed on maps to show relative quantities of the same item (see Agriculture).

When many different items, such as farm and mineral products, are shown on the same map, the items are usually distinguished by pictorial symbols that are explained in a key. (For examples of this type of map, see Russia; Africa; Australia; South America; North America.) When only a few different items are represented, shadings or cross-hatchings may be used. (See Grasslands; Land Use.)

# Organization and Flow Charts

The organization chart does not show quantities. Its purpose is to present in diagrammatic form the interrelations, the responsibilities, and the authority of the various units of an organization. The units may be officials or they may be departments of a government or a business. The names of the units are usually enclosed in boxes or circles, and these are joined together by lines that indicate the flow of

responsibility and authority. (For examples, & Police; United Nations.)

The name flow chart is given to organization charts that show successive movements through a process, from beginning to completion. The simplest type of flow chart resembles the organization chart, with arrows indicating the direction of the flow. A more striking form of flow chart shows pictures of the various steps. (For examples, see Cement; Internal Combustion Engine; Iron and Steel; Paper; Petroleum; Refrigeration.)

## Other Types of Graphs and Charts

Probably the earliest charts were maps of heavenly bodies and their movements. Later, charts were used as maps of sea lanes for navigators. Both types of charts are used similarly today. (See Stars.) Maps are sometimes distorted in size and shape for emphasis. Pins stuck in standard maps locate customers or facilities. Comparisons of almost any sort can be visualized by ingenious graphs.

Great ingenuity has been shown in the designing of charts for advertising and in the animated charts for instructional movies seen in classrooms and on television. These charts add meaning to statistics by giving movement to people, machines, lines, and bars.

## Books about Graphs

Arkin, Herbert and Colton, R. R. Graphs, How to Make and Use Them (Harper, 1940).

Modley, Rudolf and Lowenstein, Dyno. Pictographs and Graphs (Harper, 1952).

Spear, M. E. Charting Statistics (McGraw, 1952).

GRASSES. Of the many plant families, the grasses are the most useful and important. They carpet a large part of the earth's surface and furnish, directly or indirectly, most of our food. The world's bread is made from the cereal grasses, such as wheat, corn, cats, rye, barley, rice, and millet; and cereals and other kinds of grasses furnish most of the pasturage that fattens our meat animals.

Grasses are also the most widely distributed of plant families. Pygmy grasses, mosslike grasses not over two inches high, cling close to the cold ground right up to the borders of the field of ice and snow. The giants of the family are the bamboos, which grow 100 feet tall or more in the burning heat of the tropics (see Bamboo). Other tall species form the almost impenetrable canebrakes of the South. These are used for fishpoles and for "reed" furniture and "canescated" chairs. Small and middle-sized grasses, growing in greatest luxuriance in the North Temperate Zone, make up most of the more than 4,000 species included in the family. In the United States alone there are more than 1,000 species. One dooryard may contain a dozen kinds or more.

Grasses grow on all kinds of soil and in all sorts of conditions. They thrive on the banks of streams, along the seashore, in the low, wet marshlands, in the sunny meadows, or in the shade of woodland and orchard. Some varieties, such as sweet vernal grass, June grass, and orchard grass, are among the first spring plants. Others, like timothy, redtop, and

hair grass, flourish in midsummer. Even automa has its grasses—the beard grass and the dropsed grasses of Sentember and later.

Some species are valued mainly for lawns and parks kentucky and other bluegrasses and the bent grasses are popular. They make a thick carpet of dark green color. Many grasses are raised in gardens for their plamy sprays. Among them are pampas grass bottlebrush grass, culatia, and ribbon grass.

Grasses Check Erosion

After algae, fung: and moves grasses are among the first plants to cover barren planes and to prepare the way for plants of larger and slower growth. Many grasses pread by means of runners or rout-stocks. These are underground stems with a succession of some From the joints From the joints roy grow downward and stems grow upward. Thus a network of roots and stems reaches in all directions handing the sol firmly in place. Such a network with its thick mat of turt helps prevent the topsoil from blowing away. It also slows down the evaporation of more time and the run-off of water and sold during and after a rain.

When the grays cover is dectroyed erosion often follows. On the Greut Plains of North America far mere plowed up the native grasses or permuted them to be overgrazed. This resulted in dust storms, which

reduced the land to a near

deest (see Ecology) Elsewhere farmers plowed up grassy hillsdess and planted such crops as corn on them Soon rainfall and running water were nashing away the sol and were cutting gullies in their land. To hold the topool, grasses are planted on hillsdes and wind wept fall and along highways and railroads.

Graves will grow where ground mosture is not suffrient for trees. All the continents once had grasslands but much of this land is now under cultivation (see Grasslands). In the United

blates bhe stem was the leading tail grass on the process steeth is, west-ward from the eastern foorets across the Mass supply and the northwestern prisens needle and wheat grasses were characteristic. West of the 20-mil line the Great Flams was shortless. Here the vided as slappe by grouppheness stored for each steet of the ste

d grew as bunch grass in direr places Winners in the Plant Race of Life

Grasses are well fitted for survival They renew themselves and sprend from routstocks or by scattering their seeds They grow rapidly Some species grow two or three seet in 24 hours and the bamboos may reach a height of a hundred seet in three months

Grasses are able to resst drought because they have then walled cells between the vens of thur leaves. These cells keep the leaves expanded under normal conditions but full up the leaves to slow down evaporation during a drought. Because grasses are hardy and grow rap dily, some of them become persistent weeds. Among the worst are Bermuda grass, Johnson grass, and quack grass (see Quack Grass)

Grasses form the botameal family Grammage. The plants are monocotyleidonous. They have jointed stems with leaves arranged in two opposite rows a single leaf at each joint of the stem. In most grasses the stems are bollow, but corn sorghum and a few others have

stems filled with soft pith

The leaf as a long marrow blade. Its base as a sheath which endoses the stem. The flowers are enclosed in glaunes or claffillies scales and are arranged in spike the wheathcade or in praincies like the out. They depend upon the wand to scatter their poller and lock color or persure to attract mesers. Clovers, affilia, and other plants which are used for hay are often called graness although they are not true grasses.

GRASSHOPPER A greedy appelite for most of the things people grow in their fields and gridens greagraschoppers a bad reputation. Farmers know them as one of the norst insect peats. When grasshoppers magrate in great swarms exting all green plants in their path they are called focuse. The 17 year to cust, however, in not a found but enough (see Chenda).

A, hower, is not a locust but e corda (see Creada)
RENGHY SHORTRENGH YOUNGER

Seemints stead estimate and yellow, or reddath brown insect of that type the shortborned grasshopper! because it has two short thick antenane, or feelers TI cen as another muset called the
long borned grasshopper
it is a small green loopes another muset called the
long borned grasshopper
it is a small green loopes or
each longer than it body. It is
more closely related to the
ladydids than it is to the
located CTPs actole will

describe only the true locust or short-horned grass hopper)

The Well Equipped Hopper Children like to catch grasshoppers as they leap over weeds and grasser. They also enjoy watch ng il ese

The brownsh find is the grassloopers defease against some of its enemies. The find is however, hardees to man In the summer it is interesting to capture a grasshopper and to study it carefully Pat the meet in a large glass par and cover the top with gaure. Look closely at it through a magnifunc stars.



his greathapper los armiess amough but i destructive pest. Wh seshappers migrate rgs numbers they m it avery green plant their bulb.



The female grasshopper uses her egg-laying organ, the ovipositor, to drill a hole in the ground an inch or more deep. There she lays her eggs. When hatched, the young are about the size of large ants. As they grow they shed their skins, or molt, several times over a period of about six weeks.

The grasshopper has a long hammer-shaped head. Its great compound eyes, placed high on the head, give the insect an appearance of solemn wonder. It also has three tiny, simple eyes, one in front of each compound eye and one between the compound eyes. Its antennae wave nervously.

Give the grasshopper a green leaf and watch it eat. It holds the leaf hetween the claws of its two front legs, and bites and chews this food with its two pairs of jaws. The upper jaws, or mandibles, have notches on them. As it eats, the insect constantly taps the leaf with the palpi, or feelers, which are on its lower lip.

This famous jumper has highly efficient logs. The front and middle pairs are short. The rear pair are longer than its entire body. Each rear leg has an upper section, called the femur, which has very strong muscles. These muscles give this part of the leg its heavy and hraided appearance. The lower part, or tibia, ends with sharp spines just before it joins the foot. When the grasshopper is preparing to jump, it digs the spines into the ground and brings the tibia and femur together. Then it suddenly straightens the legs and shoots forward like a released spring. In one hop it can jump 6 to 10 feet. This is from 70 to 120 times the length of its hody.

Look at the grasshopper's feet as it climbs up the side of the glass jar. Each foot ends with a pair of sharp claws. Between the claws is a cushion-like pad called the *pulvillus*. It is covered with sticky hairs which permit the insect to climb on smooth surfaces.

Flying, Hearing, and "Singing"

Grasshoppers usually fly only short distances. But when they are forced to migrate

in search of food, they can fly "short hops" which total many hundreds of miles. The insect has two pairs of wings. The forward pair are thick and tough and are used only as a protective covering for the filmy rear wings. When the insect is flying with these rear wings, its forward wings are held straight in the air, stiff and motionless. When the rear wings are not in use, they fold up like fans and lie along the insect's back beneath the forward pair.

The grasshopper has two ears, one on each side under its wings, on the first section of its abdomen. Each ear is a round hole covered with a clear thin membrane which serves the same purpose as the human eardrum. One kind of grasshopper "sings" by rubbing its rear legs together. Another kind rubs its legs against the tough wing covers. As a grasshopper flies up out of a field, it makes a crackling sound by rubbing its hack and front wings together.

Egg Laying, Hatching, and Growing Up

Grasshoppers lay their eggs in the late summer and fall of the year. At the end of the female's hody are four short thick prongs. The upper pair curve upward, the lower pair bend downward. With these prongs she bores a hole one to two inches deep in the soil of fields and grassy areas. Then she spreads the prongs apart and deposits the eggs in the hole in a mass of from 6 to 150. She covers the eggs with a frothy substance which hardens and forms a protective pod around them. The pod also provides air space for the young, 'hoppers when they hatch underground.

Each egg pod is  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches long and  $\frac{1}{6}$  to  $\frac{3}{16}$  of an inch in diameter. The pod's outer surface is usually covered with bits of soil, gravel, and roots. The female lays several egg masses with their protective pods, each in a separate hole. She may lay as many as 12 to 21 pods a season.

HOW THE GRASSHOPPER GETS ITS WINGS

1. This young short-horned grasshopper has already molted several times and its wings are just beginning to appear. 2. In the fifth and final molt the grasshopper, with wings fully developed, leaves the old skin. 3. The new wings have dried and opened out to their normal size. Near by hangs the old skin.

CONTROLLING ONE OF THE FARMERS WORST PESTS

mg them out of the ground Ground squirrels and field mice also eat the insects and their eggs. Yet these enemies have not prevented grasshopper plagues

revented grasshopper plagues
Plagues and Control Measures
Short-horned gras hoppers or locusts

we are more green uppers or locusts are among the world's worst insect pets. Whenever green plants grow they may appear in great numbers. The Bible says that they were one of the ten plaques of Egypt. As early as 1797 they damaged crops in New England.

The plagues of 1874 and 1877 were na t onai duasters. Great swarms of grass shoppers or gunated in the plains east of the Rocky Mounta in They spread to the Missass pil valley and southward into Tex as. They appeared on the honzon like a black storm. The roar of their wines was

deafen ng As they settled smaller limbs of trees broke under their weight Railmad tracks became so al ppery with their bod es that trains had difficulty in running They ate the family laundry hanging on the line outdoors and invaded houses to chew the curtains uphol stery and rug Their remans polluted the wa ter in wells and creeks When they moved on not a hying green plant pea amer

With the coming of win ter the adult grassl oppers die and the species passes the winter in the egg stage When the hoppers hatch m the spring they quickly work their way to the surface and shed the mem brane which covers them. They are finny little fellows about an eighth of an inch long with big heads long legs and They begun no wings to eat greedily of green

plants and to grow rap-

idly Five times over a period of about a x weeks they burst out of (moit) their skins After the fifth molt they are adults and their skins are skins and their skins are skins and their skins are skins as the skins are skins as the skins as the skins as the skins are skins as the skins as th

the fifth most they are adults and loser wings bodies and legs are fully developed. Grasshoppers undergo incomplete metamor phons that is the baby hopper does not start life as a larva and go through a quiet

pupal stage It is similar in appearance to its parents

Many Natural Enemies

Grasshoppers have many natural enem es Without the help of these enemies men would find it more difficult and expensive to control the pests. Flesh fie et depost their maggots on grasshoppers. The female fly are birth to living maggots instead of eggs. She stracks the grasshopper usually when it is in fight and attaches the mangots to its body.

Bl ster beetles carabid beetles and bee first lay their eggs in the soil close to grasshopper egg pods. When the fly larvae hatch they work their way into the grasshopper pods when the eggs. Birds eat countless grasshoppers and some eat the eggs after seratch



(upper left After a swe in attacks a constitute it is a repect of a every leaf (upper styld. Po some has to a the heat way to kull this powhen the an and sind, water and ye som a a mad toge her cent Than f om the hatch of a tinck two pace scotter the best by head over it has a That works about 20 at a man how.

Grasshopper plagues still occur at least once every ten years in the United States. The Western states of the Great Plains, Rocky Mountain, and Plateau regions are the most severely affected. In these states during the ten-year period 1936-45, grasshoppers caused crop damage estimated at more than 400 million dollars. At the same time, crops valued at some 600 million dollars were saved by control measures.

Since 1934 Congress has appropriated money for grasshopper control. The government provides free bait materials to the states. Each co-operating county issues the poisoned bait to farmers. It is a mixture of bran, sawdust, and sodium fluosilicate. Chlordane or toxaphene may also be sprayed over fields by low-flying airplanes. Fields are plowed in the fall to destroy the eggs.

At least 90 per cent of all grasshopper damage to cultivated crops is caused by five species: the migratory grasshopper (Melanoplus mexicanus), reddishbrown, 1 inch long; the differential grasshopper (Melanoplus differentialis), yellow with black markings,  $1\frac{1}{2}$  inches long; the two-striped grasshopper (Melanoplus bivittatus), greenish-yellow with black or brown marks,  $1\frac{1}{4}$  inches long; the red-legged grasshopper (Melanoplus femurrubrum), reddish-brown above, yellow beneath, with red luind legs,  $\frac{3}{4}$  inch long; and the elear-winged grasshopper (Camnula pellucida), yellow-brown, 1 inch long.

Grasshoppers belong to the order Orthoptera. Shorthorned grasshoppers belong to the family Locustidae (Acrididae); long-horned, to the family Tettigoniidae. Western, or Mormon, erickets, which also damage crops, belong to a subfamily, Declicinae, of the long-horned grasshoppers.

### BATTLING A GRASSHOPPER PLAGUE



These Colorado housewives are sweeping masses of grasshoppers off the steps and front of their farmhouse. Such swarms strip the fields of growing crops and even find their way into homes and barns.

GRASSLANDS. The meat and grain for much of the world's population is produced in grassland regions. About one fifth of the earth's land surface once had a natural cover of grass. The grasslands stretch for hundreds of miles between forests and deserts. Near the forests where rainfall is abundant, trees grow intermixed with tall grasses. Gradually, as the grasslands stretch away from the forests the rain decreases and soil conditions change. Trees are smaller and fewer. Then come vast stretches of treeless tall grass that may stand several feet high. In semiarid regions on the margins of deserts grow short grasses only a few inches tall (see Climate; Deserts).

Savannas—Grasslands of the Tropics
In the low latitudes where there is a distinct dry season lie the tropical grasslands, called savannas. Near the edges of the equatorial rain forest, trees are mixed with the grass. Along streams the trees often form arches over the water, called gallery woods. As the rainfall diminishes, scrub forests, thorn forests, and bushes take the place of larger trees and eventually there is only a grass cover. Where savannas border the deserts, the lands are sometimes called tropical steppes.

Savanna grasses are coarse and rank-growing. They range from two to twelve feet in height. Young blades of dull green spring up rapidly at the start of the wet season. Most plants grow singly; some in thick bunches. They are separated by bare spots of reddish soil. As the plants mature, the blades grow stiff and harsh. In the dry season, they change to a dusty yellow or brown and slump to the ground.

On the drier margins of the savanna in Africa and Australia, the grass cover is broken by trees of the flat-topped acacia type. In the parklike savanna com-

mon in the *llanos* of Venezuela, the campos of Brazil, and the Sudan of Africa tall grasses are mixed with low trees and thickets.

Savannas are the natural home of many animals. Grass and the foliage of low trees provide food and shelter for plant-eating (herbivorous) animals. These in turn attract many flesh-eating (carnivorous) animals. Although the savannas of the various continents are similar, the animal life differs widely. The South American savannas have few specics of mammals and the animals are small. They include red wolves, pampa deer, jaguars, tapirs, and peccaries. They do not approach the size, beauty, and majesty of the lions, leopaids, zebras, giraffes, elephants, huffaloes, and other big game found on the African savannas (see Africa). Mosquitoes, ants, ticks, and other insects make life miserable for animals and people of the savanna. Many birds, such as the brilliant-colored parakeets, live among the trees beside the streams, especially in South America.

Most savannas are either plain or plateau but a few are hilly. At the beginning of the rainy season the banks of streams are quickly



Here we see the location of the three types of grasslands. Lit tie of the original prairie now hears a motile of tall gress fortest farmers raise fine crops on its rich soil. The moister

et one of the stepps are ou valed and the rest a valuable pasture B ead etretches of the trop cel saveous remain wild grasslands the home of huge numbers of game snimals

flooded. In the dry seasons, the r vers return to their channels leaving large alluvial flats to dry in the sun The flood plums and deltas with the r alluvial soils are the best places for settlements. Although savanna so is are generally better than those of the run forests the land is not very good either for crops or for pasture (For soils of the various grasslands see also Souls )

Stock ra sing is the common messe of live! bood of the fe v neonle who has on savannas. The stock suf fers from drought heat and pests and is usually of low quality Cattle is wealth to the tribes of the African savanna Overgrazing and grass burning have led to serious erosion of the so! Some of the people plant gardens or fields in the ramy season They raise sorghum millet yams sesame tobacco and short-staple cotton

Tall Grasses and Rich Crops on the Prairies In the middle latitudes with the r wide range of temperatures grasslands bear finer and shorter grasses The progree has tall deep to ted invurnant grasses usually mixed with a variety of flowering plants The grasses average from one and a half to two feet a he ght A striking feature of the or g oal prairie of the United States and the Argentine pampa was the vast expanse of tall grass blio mg in the wind Except for woods along streams the natural prairie is a treeless rolling pla n

The prairies in general are in regions in which the annual rainfall averages from 20 to 40 mebes with the heaviest fall in summer. In the more hamid sections there would seem to be enough ramfall for trees Various explanations have been g ven for the complete dominance of grasses The occasional dry years averaging one in twenty may have withered any young trees present and permitted the hardy grasses to take over Or grass fires started by the Ind ans or by lightn ng may have killed the saplings Prame soils are among the most product as on earth. All the major practies are today important agricultural areas. Here sie the world's greatest

bread baskets When settlers came into these areas they disturbed

the balance of nature. This was especially noticeable in the United States. The settlers killed many of the native suimals-deer elk for bear bobcat and others. They plowed up the grasses to plant crops Some an mals were w ped out other increased Certa o b rds -grouse partridge pheasant-were slaugh tered and animal pests such as the gopher increased The chinch bug which had fed on nati e grasses attacked the farmers grain (See also Foology Insects section Insect Pests North America section Plant and Animal Life of North America ) Steppes the Great Pastures

Short shallow rooted grasses often growing in hunches with bare so I showing cover large areas in the middle lat tudes where the average annual rainfall ranges from 10 to 20 inches. These are the steppes usually located on the margins of the deserts. Moun tam interrupt the pattern so steppes do not border all dry regions. In North America, the large steppe area computes with the Great Plains lying between the prairies and the Rocky Mounta as and reaching from southern Canada into Texas

The grasses of the steppe are usually only a few mehes high Steppe land cape is monotonous In wetter years tall plants may rise above the grass The best of the grassland so is are the chernozems found on the border of pre me and steppe. They can be cultivate I for long periods without using tertilizers if they are protected against erosion

## GRASSLANDS OF THE MIDDLE LATITUDES AND TROPICS



Grasslands of the Argentine pampa are a type of prairie. expanses of grass on which sheep graze are interrupted by small stands of timber bordering the streams.

Steppes are the natural home of numerous animals, but there are not as many as on the savanna. As settlers moved in, the native animals, such as the bison, or buffalo, of the Great Plains, were slaughtered. Now man has occupied nearly all the steppes with the plants he has cultivated and the animals he has domesticated.

### Land Use in the Grasslands

The population of the world's grasslands has been estimated at about 300 million, or about 12 per cent of the world's total. This is an average of about 25 people to the square mile, but the population is not evenly distributed. Most savanna and steppe areas have far fewer than the average, while the prairies tend to be well settled. (For population, vegetation, and rainfall maps, see World.)

Primitive peoples, on the whole, did not use grasslands for crop raising. They had few implements to clear the tall grass and found it easier to make small clearings in the forests. They lacked machinery and skills to bring irrigation to steppes.

It was in the Old World steppe regions that most animals were domesticated. People of the Eurasian grasslands, who learned to depend on their animals, developed a nomadic, or wandering, way of life, as they followed the stock from pasture to pasture (see Nomads). Sheep and goats could be raised best in some lands and cattle in others. Horses and camels were found useful for riding and transporting goods. Nomadic life has continued for 25 centuries, but



On the tropical savannas of Southern Rhodesia, in Africa, the grasses are tall and coarse. In this region of scanty to moderate rainfall, scrubby trees spring up among the grass.

political and economic factors are making it increasingly unsuitable today.

Farming settlements were started centuries ago on the black prairies of Russia. Other prairie lands of the Old World have long been used for farms. In North America the settlers avoided the prairies until the steel plow was invented to break the tough sod Today the praines are one of the world's richest agricultural and industrial regions (see United States).

Steppe areas here and elsewhere were first used as pasture by cattlemen. Settlers streamed in only after railroads had been built to carry cattle and other produce to market. Farmers succeeded ranchers as huge machines were invented to plant and harvest big grain fields. Often the farmers cultivated regions of inadequate and uncertain rainfall. In dry years winds carried away the soil in immense dust storms. Pasture lands were eroded too as overgrazing destroyed the carpet of grass.

Today efforts are being made to remedy these mistakes and to make better use of the land. Fields are being returned to grass where necessary. Farmers are adopting dry farming and other soil- and moistureconserving methods. Irrigation systems are being built to supply a dependable source of water. (See also Conservation.) Wider use for savanna pasture is promised as stock raisers learn successful methods of exterminating posts and introduce breeds that can

withstand heat and disease.

## GRAVITATION—The FORCE

RAVITATION. Everything on earth tends to fall or to seek a lower position unless it is held up by something beneath it. Even balloons and corks are not the exceptions they seem to be. The air or water is heavier than the balloon or the cork. Thus it tends to push the lighter object upward and flow in to use the vacated space, so reaching a lower level. The force that causes bodies to fall to earth is called gravity. Gravity's pull is always toward the center of the earth. A pebble dropped from a person's hand

## That BINDS the UNIVERSE

in the United States falls to the ground in just the way it would fall in Australia, on the opposite side of the earth. In both cases, the pebble falls toward the earth's center.

For thousands of years men have wondered about the workings of gravity. Early Greek philosophers thought of gravity as a force within an object that propelled it downward. "Downward" they thought of as a single direction in space, for they had little idea that the earth was round and that "down" meant toward its center. The great philosopher Aristotle thought that the heavier an object was the more of this force it possessed, and so he said a heavy object must fall more rapidly than a light object. Its rate of speed he thought, must be proportional to its weight.

Law of Falling Rodies

For nearly 2 000 years this idea went unestallanged Not until near the end of the lifeth entury bid say, one try to test the truth of Anytothe statement At that time the Italian scientist Gahleo Galdie legan his experiments with falling bodies. He did nucle to this work in the city of Pra. There according to no lold tradition. he dropped objects of different weights from the famous leaning tower to show that whether preached the ground at the same instant. Whether he estually did so or not is doubtful but the certually did prove that objects fall at the same into regardless of their weight.

Gallaco may have reasoned in this way Suppose two objects of the same weight and size—say two blocks of iron—are dropped from a height. Obviously they will fall such by and at the same speed and etike the ground at the same moment. Suppose them that this blocks are soldered together and dropped that the blocks are soldered together and dropped make no difference in their behavior they will fall at the same sold as before Yet now the soldered at the same sold as before Yet now the soldered

blocks are really e single object of twice the original

size and weight Through experiments with balls on an inclined plane Galileo proved that falling bodies constantly acquire more speed as they fall. The farther an object falls the faster it moves. An apple falling from the limb of a tree 16 feet above the ground strikes the ground in one second and one dropped from a tower window 64 feet high etrikes the ground in two seconds In other words a falling body drops 16 feet in the first second 48 feet in the next en 1 80 feet in the third-a total of 144 feet in the first three seconds Every second that a body falls it increases its speed by some 32 feet per second This increase is called acceleration due to gravit; or gravitational accelera tion In science it is often designated by the letter g The value of g as used by phys cists is 32 1740 feet (980 665 centimeters) per second in every second The latter phrase is often expressed per second per second or per second squared

The physical a formula for the Law of Falling Bode physical as for each state of the Law of Falling Bode physical state of the Law o

y break bones of kill a person Terminal Velocity

Despite the Law of Falling Bodies at 19 true in a sense that light bodies fall more slowly than heavy ones. It is obvious that a feather or a dry leaf falls.

more slowly than a lead pellet. The fact is that the have holds for objects falling in a consens but not for objects falling in a fixed such as are or water. A common laboratory demonstration above the truth of the law. The are is pumped from a large glass tube that is closed at both each Inside are a feather and a lead shot. When the tube held vertumily is inverted the feather falls to the opposate end

as rapidly as the lead shot

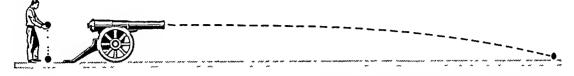
Objects falling through a fluid such as are or water are beld back by the fluid Resistance by the fluid everts a force on the falling body opposite to the force of gravity. This dimanishes the effect of gravity and so slows the fall. The resistance is proportional to the amount of surface area the body has In the ease of a feather the amount of surface area very greate in proportion to the weight. Thus resistance of the air has a greater effect on a feather than it does upon a but of head with its small surface has it does upon a but of head with its small surface.

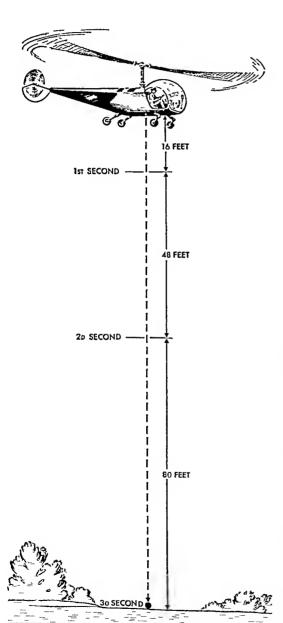
Every object falling freely in a fluid eventually reaches a terminal velocity. At a certain point in the fall—if the fall is long enough—the object reaches its greatest speed and cesses to accelerate. From that point to the ground it falls at en even rate of sneed because the resistance increases with the



famous tradition tells how Galileo proved Ariatotle wrong b opposing weights from the leaning tower of Pisa. The story is subtrall but at its known that he proved the truth of the maintenance of the producted at a nearly university.

### HOW OBJECTS FALL THROUGH SPACE





The Law of Falling Bodies developed by Galileo is illustrated by dropping a weight from a helicopter 144 feet above the ground. The speed of the weight is increased every second by 32 feet per second. This increase is the acceleration due to gravity.

The laws of gravity hold whether an object is falling vertically through space or whether it is moving forward as it falls. A cannonball fired horizontally reaches the ground at the same instant as one dropped from the height of the cannon.

speed of the falling body and the force of gravity stays constant. Thus a point is reached when the force of gravity, tending to accelerate the body, is exactly equaled by the resistance of the fluid, tending to slow it down. When the two forces are balanced, the body falls at a constant rate, which is its terminal velocity.

Terminal velocity varies according to the object and the fluid medium. A ball bearing falling in heavy oil may reach a terminal velocity of only an inc't or so a second. A bit of thistledown in still air falls at a speed of a few inches a second. In water even a stone falls only a few feet per second. A man falling through the air from an airplane may reach a terminal velocity as great as 220 miles an hour (326 feet a second). This is the case if he reaches terminal velocity at 40,000 feet altitude. If he falls to the 5,000-foot level, where the air is denser and more resistant, his velocity will be decreased to about 130 miles an hour.

### Universal Gravitation

The same force that causes objects to fall to the earth is the force that holds the earth and the other planets in their orbits. In referring to these large manifestations of the force, we call it gravitation rather than gravity. Scientists generally use the word gravity only for gravitation at the surface of the earth.

It was the great English scientist Isaae Newton who developed the concept of gravitation. According to an old (and not very reliable) legend, he was walking in an orchard while turning over in his mind the problem of what keeps the moon swinging around the earth in its orbit. Seeing an apple fall from a tree, he asked himself if the force that is felt everywhere on earth might not keep the moon in its course by constantly pulling it toward the earth. Might not terrestrial gravitation be only one manifestation of a universal law of gravitation ruling all motion out to the farthest bounds of space?

Isaac Newton was not the first man to whom such an idea had occurred. The great mathematician and astronomer Ptolemy of Alexandria had surmised something of the kind in the 2d century A.D. Others since that time had had vague inklings of the existence of the great force suspected by Newton. It is a long way, however, from vague surmises to sound scientific theory based on proof, but the materials for such proof had been gradually accumulating

from Ptolemy's time to Newton's Newton attempt. ed to but his theory to the test of calculation but his results did not agree with the moon a observed course and he laid the idea as de for years. At length more accurate figures were obtained for the distance of the moon from the earth. When these figures were used calculation of the effect of gravitation on the moon was found to agree exactly with the moon's course Similar calculations for the other heaven'y bod excompleted the chain of evidence

Newton's law of gravitation is that every nothele of matter attracts every other particle of matter with a force that varies directly as the product of their masses and unioracly as the source of the distances between them One fact to remember is that attraction as mutual. While the earth is attracting a grain of sand the grain of sand also attracts the earth. The

planets pull the sun while the sun pulls them Through the use of the calculus a mathematical method that he invented. Newton proved that bodies such as the earth and moon attract each other as if their masses were concentrated at their centers. This

Point is the center of mass or center of gracely Every object whatever its shape has a center of gravity The location of this center with respect to supporting structures determines whether the object stays in belance or not. The center of gravity of the han an body for example must be kent over the feet if a person is to keep from falling A haby learn me to wak has great difficulty managing this A tightcore walker on the other hand has learned to rentral his center of gravity so sk lifelly that he can stand and walk on a thin supporting nire

Newton also developed the concept of most so d street from sought In this concept mass is the amount of matter a body possesses and we ght is the force imported to this mass by the force of gravity. The proportion of a body a mass to its volume is its density of specific granty. These concents are discussed in the not the Physics

New Concepts of Gravitation

Until the 20th century gravitation had always seeme I to be a fo ce with qualities that set it most from other physical forces such as magnetism Unlike magnet m gravitation seems to nork equally

upon all types of matter Einstein in his Generalized Theory of Gravitation developed the idea that gravitation is only a special case of a much targer concept that includes light motion electricity and magnetism. For I netein, gravitation was a property of space rather than a force in Newton 8 sense (see Relativity)

### The HEART of the BRITISH EMPIRE



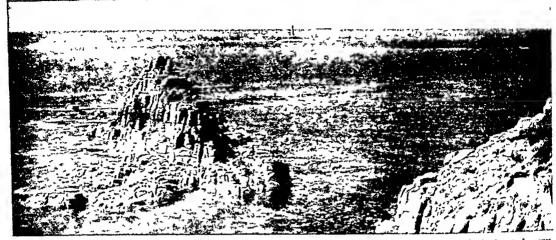
REAT BRITAIN AND NORTHERN IRELAND UNITED KINGDOM OF The long name of the United King dom of Great Britain and No-thern Ireland is usually shortened to Britain, Great Britain or United Kingdom Americans generally use the terms Britain and Great Britain while the British particularly in offi

cial publications prefer United Kingdom Strictly speaking the name Great Britain should be used only for (1) the island of Great Britam the

Abbey Behind the famous church stands or Hall mow part of the Houses of Parliam

largest of the British Isles and (2) the union of nations that occupy this island England Scotland and Wales The United Kingdom includes all the terntory of the British Isles (except the Republic of Ireland) and m addition the Channel Islands off the coast of France The word British refers to all people living in the United Kingdom-Figlish Scottish Welsh and Irish Britannia the Latin name for Britain is used poetically as in Britan-

## LAND'S END, THE WESTERNMOST TIP OF BRITAIN



Only in the southwest does Britain face the open Atlantic Ocean. On the last rock to seaward stands Longship's Light-

house, a proper symbol of a nation that is the heart of an over seas empire built upon ocean commerce.

nia rules the waves." Official documents refer to the monarch as His (or Her) Britannic Majesty.

How "Britain" Came to Be

Before 1707 Great Britain was merely the name of the island. The chief country in the island was England. England had added Wales by conquest in 1282. To the north was the separate kingdom of Scotland. In 1603 James VI of Scotland ascended the English throne as James I of England, joining the two countries under a single ruler. For more than a century England and Scotland had separate governments under the same king. In 1707 the Act of Union brought them under a single parliament. The name "Great Britain" was then formally adopted for the united countries (see English History). In 1801 another Act of Union brought Ireland into the same government under the name of the "United Kingdom of Great Britain and Ireland." In 1922 southern Ireland became a dominion with its own parliament (see Ireland). In 1927 an act of Parliament changed the name to the "United Kingdom of Great Britain and Northern Ireland."

The British flag, called the Union, symbolizes the union of Scotland, Ireland, and England. Before the first Act of Union the flag of England was white.

with a large upright red cross; that of Scotland was blue, with a diagonal white cross; and a red diagonal cross was one of the emblems of Ireland. In the Union flag, all three crosses are united (see Flags; see also England; Scotland; Wales; Ireland, Northem, British Commonwealth; English History; Parliament).

### THE UNITED KINGDOM

AREA IN SQUARE MILES POPULATIONS

GREAT BRITAIN England (including Scilly Is-50,874 41,572,555 lands and Isle of Wight) ... Wales (including island of 2,172,339 7,466 Anglesey) Scotland (including 186 islands, chiefly the Shetlands, Orkneys, Hebrides, Arran, 5,095,969 and Bute) ..... 30,405 48,840,593 88.745 Total, Great Britain .... 1,370,709 5.238 NORTHERN IRELAND..... 55,213 221 Isle of Man† ... 102,776 CHANNEL ISLANDST. Grand total, United 50,369,591 94.279 Kingdom .....

\*All populations are 1951 census, preliminary, †For statistical purposes, often included in Great Britain.

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THE BRITISH ISLES

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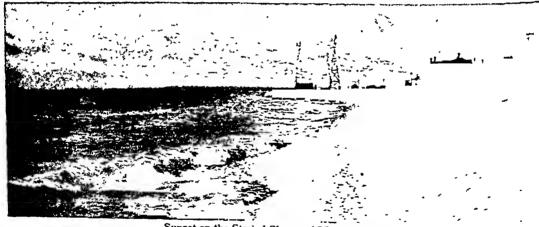
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#### The Five GREAT LAKES AMERICA NORTH



Sunset on the Storied Shores of Mackinac Island

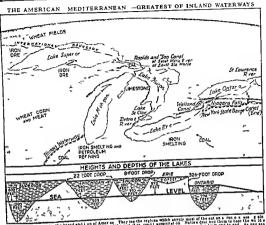
REAT LAKES. The five huge lakes that lie in the heart of eastern North America form by far the greatest connected area of fresh water on earth. One of them indeed-Lake Superior-is bigger than any other fresh-water lake and bigger than any saltwater lake except the Caspian Sea. Put together, the five lakes would more than cover the states of New York and Pennsylvania.

The map at the top of the next page shows that four of the lakes straddle the boundary between Canada and the United States. Only Lake Michigan lies wholly inside the United States. Of the total area, nearly 95,000 square miles, the United States has about 60,000 square miles.

Turn to the table in the Fact-Index under "Great Lakes." It gives the measurements of each of the

five Great Lakes. You will notice that Lake Superior is the deepest as well as the largest, Lake Ontario the smallest, and Lake Erie the shallowest. Lake Huron has the longest coast line.

A ship leaving Duluth at the extreme western tip of Lake Superior will travel about 1,160 miles before it reaches the place where Lake Ontario pours its waters into the St. Lawrence River. For a ship leaving Chicago at the head of Lake Michigan, the journey to the St. Lawrence would be about 60 miles shorter. If a vessel skirted close to the shores of all five lakes in succession and returned to its starting point, it would make a voyage of about 8,000 miles and would pass eight states (Minnesota, Wisconsin. Michigan, Illinois, Indiana, Ohio, Pennsylvania, and New York) as well as the Canadian province of



These this writer enter the bread end is not America. They implies the carryly note of the sations rice a see of find of many and the carryly note of the sations rice and the contract of the carryly not the sations are the sations and the carryly note that the sations are the sations a

Ontario These eight states have more than a third of all the people of the United States

With their connecting rivers and channels this American Mediterranean forms the world a greatest inland waterway Back and forth across it floats a volume of commerce greater than the entire foreign

trade of the United States
The Great Lakes make a sense of four downward
the Great Lakes make a sense of the degram
steps from west to east as illustrated we the degram
steps from west to east as a illustrated we then all
Supernor empty through the termining. So, or ap ids
supernor empty through the throne and Michagus
(see Sault Santa and Detroit River and Michagus
(see Sault Santa and Detroit River and Lake Brune
Then comes the great plungs over Napaga Falles
Lake Ontario (see Nagaar Falle)
Lake Ontario (see Nagaar Falle)
Analysis described
united waters pour through the St. Lawrence River

to the open ocean 2 350 m les from Duluth Sources of the Great Lakes

Sources of the Great Lakes
Where does this flow of fresh water come from?
What keeps these huge lakes filled year after year?

Surely some mughty streams must drain into them But if you look at the map of North America you will see that almost all the review for the Great liber review and a see that almost all the review and some of the most and not threat liber review and some of the seed and not the seed in the Hudson Bay to the viet and some of small streams and brook emples with College and Look of small streams and brook emples with good of small streams and brook emples with good of small streams and brook emples with good of take Nipigon into Lake Superior from the north and the selender Mixlegeon and Manuster verse of the lower Michigan pennisula are among the largest lake ir butterns.

These small streams contribute little. The man source of supply is the ground water (vaster table) that she slowe to the surface of the while Great Lakes region. The lake be's are simply bears that dip blow it eleved of this ground was purely bears that dip blow it eleved of this ground was in thus are kept filled by securge and the flow of mumerable small springs. The lakes may be compared to guantie dramage ponds or rain pools. Elevekere in this region wherever the surface of the lands dips a little goon wherever the surface of the lands dips a little deeper than usual, water appears. This explains the countless small lakes of Minnesota, Wisconsin. Michigan, and the Canadian province of Ontario.

The division is very slight between the land that slopes to the Great Lakes Basin and the land that slopes to the Mississippi Valley. From the same undertend to keep the bordering lands cooler in early surmer and warmer in early winter than they would be otherwise. On the southeastern shores of Lakes Erie. Ontario, and Michigan and on the Door Peninsula of Wisconsin are extensive orchards and vineyards that owe their existence largely to the tempering influence

of the lakes. In the spring, westerly winds hlowing across the winter-cooled lakes delay the blossoming of fruit trees until danger of frost is past, and, in the fall, warm breeze permit the fruit to ripen before

killing frosts come. On the other hand, the lakes breed sudden fogs and affect the behavior of passing storm centers in a way that is difficult

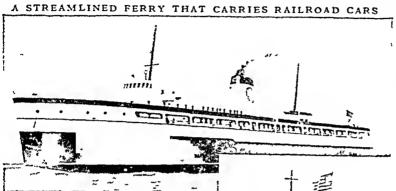
to predict. Strong winds may suddenly whip up the shallow waters along their costs into high choppy breakers, particularly dangerous to pleasure craft not designed for rough weather. In winter, the storms that sweep the lakes match in destructiveness those of

The Great Lake: have played s unique part in the development of

the Atlantic coast. Economic Importance

Twelve months in the year, regardless of storm and ice, great car ferries carry loaded freight cars across the great car ferries carry loaded freight calls actively lakes, saving many miles of travel by rail. They are stoutly built, for they are icebreakers as well as ferries. Some of them have staterooms for passengers. North America's natural resources. They connect the rich agricultural and mining regions at their western extremities with the great industrial areas and large population conters of the East. More than 100 million tons of freight pass through the Detroit River in an average season The canals at Sault Sainte Marie carry more cargo than any other canal system in the world-in some years more than the combined tonnage of the Sues and Panama canals. Moreover, this tremendous traffs is moved in a season limited to about eight months. Ice closes the lakes and channels to all but ice-hreakers

from about mid-December to the last of March. Lake transportation is far cheaper than rail. The prosperity of the American iron and steel industry depends very largely on the fact that the lakes bring together the raw materials for steel making at a minimum cost. On the borders of Lake Superior lie the world's greatest iron mines—the famous Mesabi. Gogo bic, and other ranges of northern Minnesota, Wisconsin.



ground water table that supplies the Great Lakes spring also the headwaters of the Mississippi River and its eastern tributaries. It would be difficult to predict whether a drop of rain, absorbed by the soil near the western or the southern lake horders, would find its way out through the Great Lakes to the Atlantic Ocean or down the Mississippi to the Gulf of Mexico.

Since the level of underground water varies with the amount of rain or snow. the levels of the Great Lakes tend to fluctuate considerably in wet and dry years. Over a period of years the difference in level may be as much as 2 or 21/2 feet.

Natural Environment of the Lakes

Three great tongues of land thrust out among the lakes-the upper peninsula of Michigan hetween Lake Superior and Lake Michigan: the lower peninsula between Lake Michigan and Lakes Huron and Erie; and the peninsula of southern Ontario between Lakes Huron, Erie, and Ontario. Each of these is ridged in part with low hills.

The borders of the lakes are generally low. In the north they are rocky in many places, but in the south they are mostly composed of sand, gravel, and clay. The forests that once came down to the shores have been largely cleared away for farms and cities or have been thinned out by lumberers. But, in the places where new vegetation has had a chance to spring up and replace the primeval forest, we find an extraordinary variety of flowers, shrubs, and trees. Deer, moose, hlack bear, porcupine, mink, and muskrat are still plentiful in the more remote sections.

Like all large bodies of water, the Great Lakes moderate the climate of adjoining regions. Lake winds

### NORTH AMERICA'S GREATEST WATER HIGHWAY



The Great Lakes form a rest inlead waterway for eight eletes and Canada a province of Octatio Ships from the many lake ports me ship teach the Atlanta Ocean and the Guil of Manco through temporary and agents. The lake Superior region produce more of the free or entired in the Outset Stephen and the greater part of this is shipped in a strenger at each rest.

and Michigan These supply about four fifths of the timo ore mined in the country From Duluth and Su Pernor the one is shapped for slightly more than all oblist a ten to Gary Ind on Lake Michigan and to Lake Ene ports These ports serve the steel do that of the and Permsylvana Lamestone—needed in steel making—is shapped from Calette Alpena and Port Jindand near Mantique in Michigan

West of the lakes hes one of the most unportant grain-producing regions in the world It meludes a large part of the wheat-raising areas of the United States and nearly all the wheat territory of Canada Without cheap lake transportation the farmers of these regions could not reach their foreign markets on a competitive basis with the farmers of Argentina or Australia where distances to the scaboard are not so great Port Arthur and Fort William on Lake Superior are the outlets for the Canadian grain The Duluth Superior hatbors on Lake Superior and Chicago and Milnaukee on Lake Michigan are the outlets for the grain of the United States Like great funnels these ports gather in the neest of the Northwest an average of 300 million bushels a year, to pour it out again at Buffalo and Montreal And the cost is only a fraction of what it would be by rail

The factories and railroads of the porthern Middle West are powered in great part with coal from the eastern Appalachian fields Much of this coal is carried by boat from Toledo and other Lake Erie ports to Duluth-Superior This method is slightly cheaper than shipping by rail of sheat and tron

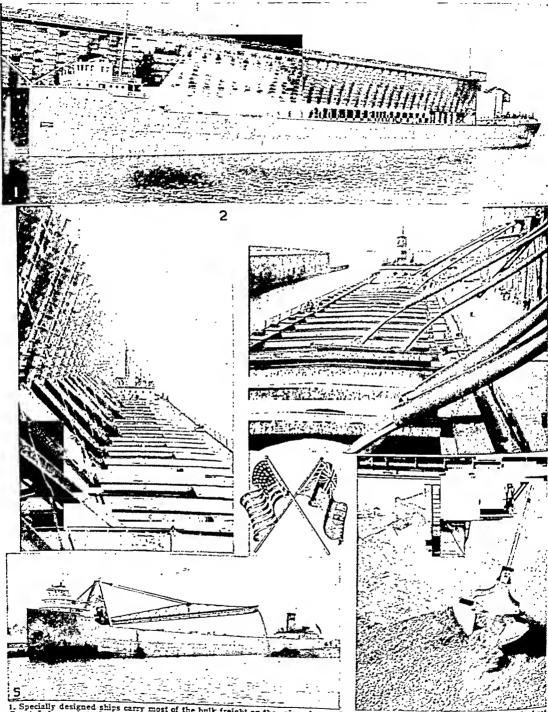
The Lumber and Oll Traffic

Lumber and lumber products once the most important saryo on the lakes, are dwinding as the surrounding area as being stripped of its most valuable tumber. Petroleum, on the other hand as increasing in lake commerce. Most of it is shipped from the retimeres at Indiana Harbor on Lake Nichegan to Detroit and Indiana Harbor on Lake Nichegan to Detroit and the lakes of the lakes of the lakes of the lakes of the sas once an unmenue volume of 'picking for of the manufactured acticles and are materials. Most of the shape for this type of freight were requisitored during the second World War for use on the ocean

Channels of Navigation
To make the lakes havigable from end to end, work

had to be done at only two important points. Considered and locks had to be built in the St. Maryo River, and the Wilsiand Shop Canal with its seven locks had to be dug around Nagars. Falls (see Welland Ship Canal). The channel through Lake St. Clair not the Detroit River has able been deepened, but locks are not need Today the main toutes of navigation, the connecting pressees, and the principal harbor channels are nor

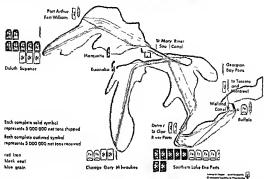
## SHIPS AND CARGOES OF THE GREAT LAKES



1. Specially designed ships carry most of the bulk freight on the Great Lakes. A typical freighter is about 600 feet long and 60 feet wide, with a carrying capacity of 11,000 tons. In the extreme bows are the mavigating and living quarters; in the extreme stern, the engines. Between the two is a single hape cargo space. The ship in our picture is alongside an ore-loading dock at Dnluth. 2. Here we are looking toward the stern of the ship. The spouts from the storage pockets on the dock are lowered through the ship's hatches to pour the iron ore into the hold. A ship can thus load 10,000 tons of ore in two hours or less. 3. This picture shows

pipes from a Duluth-Superior elevator pouring streams of wheir into a grain ship. 4. Ore boats bring back coal from Pennylvania on their return voyages. Here a giant clam-shell scorcarried along on overhead tracks is nuloading coal at Duluth 5. To serve the lake ports that lack swift cargo-handling machier, many freighters carry the kind of self-unloading equipment shown in this picture. Endless belts and bneket conveyors trate through the bold of the skip and out along that great swinging boom. The flags pictured above symbolize the peaceful sharing of the Great Lakes waterways by the United States and Canada.

### Principal Commodities and Routes in Great Lakes Shipping



fron and cod make up by fer the largest part of the bulk freight? I fon ore from the nunse of M nuscole Wescens a sed Michigan is loaded at the two parts of Dulukh and Supercraft the western end of date Superior and certred to the great from 10 steen placed as the other lakes—the

Miwaukas and the Chicage Gory region to Detroit to the cilrue of merthern Ohlo and is Buffale. Marquette and Paccasha are other non chapping points. Coal from the Appalachien fields to shipped from Leke Eng ports. Most of it movies weak

coolars on the other letter Oreie from western Croade and from the Great Piezas states of the United States or schipped from western parts to assist silve for processing and appet to processing and appet to processing and appet to year the quantum above target to year the quantum above target on year events.

mally 20 feet deep or more. This means that bare own a pring shape could travel the blakes without difficulty when there entered these waters. But traffic between the lakes and the ocean is limited by shallow, channels. The % Lawrence Rucer between lake Ontaro and Mentreal forms many impactable rapids, and the canals that have been built around them are limited to weeke foll 4 hoot draft A proposed that the United States and Canada unite in building and operating a larger and deeper Mawrence Waterayay" has been under discussion for many years (See St. Lawrence Rucer).

The New York State Barge Canal system—unchuluge the histone Erg Canal—links Lakes Ontains and Frie to the Atlantic seaboard via the Hu lea Brace. Bar much of 11 and 1912 Feet deep The Illinoos Watersay beading out of Lake Michigan through the Cliestop Dramage Canal the Illinon Sweet the Cliestop Dramage Canal the Illinon Sweet on the Cliestop Dramage Canal the Illinon Sweet on the Cliestop Order of the Control of the Cliestop Canal Sweet of School draft or less. (See also Canals, Rivers as I Illian I Waterways)

Despite their limited facilities, these links with ille sea carry a considerable volume of commerce. In some years about one-fourth of the grain carried on the Great Lakes finds its way down the St Lawrence and about one tenth down it e New York State Barge Chank Bulk sulphur from South America, wool pulp from the Scarabnavian countries and many other goods from distant lands are brought to Great Lakes ports by high-tarist occas frequires.

Playrounds and Fisherits
I e Great Lakes are one of the ration is largest and
most popular tecreation area. In summer, luxurious
passenger stamates curve them from ead to end, offering all the delights of an ocean voyage for a small
sim Millions from the crowled cites of the surrounding territory come for vecations to il er analy beaches
coded by the lake locace. Western and northern
coded by the lake locace. Western and northern
the country, with an armual business running to luxuriost of pullows of delbars (see Africana).

One of the most known vocation sports is Mackings thand, at the north end of Lake Michigan in the Straats of Alas Amac This was at one time one of the important multary posts of North America. It is famous for its clear sit and cool pineaso is, ist old four son the stream of an Alas it is freely and its French and In than traditions from fur trading days. Along the southern above of Lake

Michigan the wind-blown sand dunes with their unique vegetation have been preserved in the Indiana Dunes State Park (see Indiana). Beautiful Isle Royale at the west end of Lake Superior is a national park. In Georgian Bay, an arm of Lake Huron, the Canadian government has established the Georgian Bay Islands National Park. Point Pelce National Park, on the Canadian side of Lake Erie, is a famous bird sanctuary in a region of thick and unusual vegetation.

Great Lakes fisheries are a valuable resource. In United States waters alone, fishermen take about 80 million pounds in an average year. Lake Erie and Lake Michigan account for well over half this total. The catch of lake herring leads all others in size, but the whitefish catch is most valuable. The most highly prized Great Lakes fish has always been the lake trout. These fine fish, however, are preyed upon by sea lampreys which have made their way into the lakes, and the lake trout catch has been greatly reduced (see Lamprey). Canada and the United States co-operate in combating the lamprey menace.

### A Peaceful Frontier

Though about 1,600 miles of the boundary between the United States and Canada cut through the Great Lakes, no forts and no warships guard this frontier. Soon after the War of 1812, the two nations agreed to limit their naval forces to three small ships each

on the lakes and one each on Lake Champlain, thus establishing the principle of disarmament which has since prevailed along the entire border between the United States and Canada. The agreement, known as the Rush-Bagot Treaty. was inspired by President Monroe and John Quincy Adams, then minister to Great Britain. It was negotiated by Richard Rush, acting secretary of state, and Charles Bagot, British minister at Washington. It was

signed at Washington April 29, 1817, and approved by the United States Senate about a year later.

International questions relating to the use of the waters are referred to the International Joint Commission. This body was created by treaty in 1909 and organized in 1911. The lakes form a natural series of immense storage reservoirs, and the level of each largely depends upon conditions in the lakes above. Any permanent diversion of water, as through the Chicago Sanitary and Ship Canal, might lower the levels of the lakes and the connecting channels, thus making it impossible for ships to load to their maxim

mum draft. It has been estimated that a decrease in depth of only one foot means a loss of \$7,000,000 a year to the lake carriers. Hence any changes that affect the level of the lakes concern both nations.

### A Gift of the Ice Age

The basins of the Great Lakes were probably scooped out by the Ice Age glaciers (see Ice Age). Most geologists believe that the lakes occupy old over valleys, some of which once drained into the Mississippi, and others into the Atlantic across New York and Pennsylvania. The ancestor of Lake Superior, they believe, drained into the Mississippi at a point north of St. Paul. The ancestor of Lake Michigan drained across the site of Chicago into the Illinois and Mississippi rivers. Lake Erie waters emptied into the Ohio, and waters from the Lake Ontario region flowed southeast to the Atlantic.

When the glaciers pushed down from the north, the tremendous moving weight of the ice scoured these valleys deeper and wider. Then the ice melted and left massive bods of drift (sand, gravel, and rock) where the rim of the glaciers had been. These beds blocked the former outlets of the valleys. At the same time, as the weight of the ice was removed, the land rose, commencing in the southwest. This action tilted the surface of the region, so that water tended to flow from southwest to northeast. By the time the ice

retreated to northern Canada, all the lake were draining down this tilt into the St. Lawrence River and the Atlantic Ocean.

But the present outlet through the St. Lawrence River is by romeans stable, because the retreat of the ice from off Labrador sulfudson Bay has allowed this region to rise in recent times from south west to northeast. This is causing a reversal of the older tilting, at the rate of five inches a century every hundred miles or



Pleasure seekers as well as naturalists enjoy the celebrated sand dunes along the southern and easiern shores of Lake Michigan. Here is a rich treasure land of plant life remarkable for its variety.

from nine to ten inches at the south end of lake Michigan. If this should continue unchecked, at the end of a thousand years Lake Michigan would again flow into the Illinois River, for the divide between them near Chicago is only eight feet high today. By the year 3500 all the lakes except Ontario would flow into the Gulf of Mexico by this route. As evidence of this latest rise, geologists point to old shore lines, which lie at a slant with the present water levels.

Three Centuries of History

More than three hundred years have passed since the white man first sailed the Great Lakes. Canoes, bateaux, and sailing vessels have come and gone Fursheve given way to grain and iron, and from the widerness great cities have risen.

Samuel de Champlan is generally croticed with descovering the Great Lakes in 1615 though his interpreter Ehenne Brulé had vested Lakes Huwos several years earlier. Champlan followed the famons Algon quin route up the Ottana River, portaging across to Lake Niguissing and theme down the French Rimer to portaged east to Lake Simones and through datas of lakes and the Treat River to Lake Simones and through datas of lakes and the Treat River to Lake Simones and

Jean Nacolet in 1634 was the first to explore Lake Michigan's shorters, and Father Menard was the first (1660) to go through Sanki Sainte Mane on he voyingte outwert the Indians of the Lake Superior region. The next year the traders Radisson, and Grovelhelecoayed slong the chores of Lake Superior and Medcayed of the Sanki Sainte State of the an immunes exploy of firm. Ere mas the last of the lakes to be resched by white men [1969], owing to the houtlift of the Iroquies tribes In 1671 Dunnoset de Sing Liusen; at Sault Sainte Mane took presention of the entire Great Lakes region for France

The first saling vessel built on the lakes was La Balles of right, which was lumeded on the Nagara River above the falls in 1870. The shap was lost in storm on Lake Michigan with a valuable cargo of lins. Another quarter century passed before the first built of the same of lines and the latest of the same of Canada in 1700, the Franch figs on the toolsted forts and villages was replaced by the Birtish, and site the Treaty of 1785 the American Eag waved on all the southern shores. In the War of 1812 several important nearly engagements were fought on the hakes, notably the Battle of Lake Ene (see Perry, Oliver Researd).

#### Soo Canal Opens Lake Superior

The westward movement after the war at first left of Great Lakes untoughed Transportation was so disbuilt that few settlers found their way into the lake region. But the opening of the Enge Land in 1825 brought in a stream of immigration. Last to be settled was the Lake Supheria area. When the state of Michigan in 1840 stetmyted to obtain a federal strain of land to build a canal at Smill Saurle Mane, Henry Clay obstructed the messure, declaring that the land was beyond the farthest bounds of crulination, if not in the moon. The discovery of zons in 1844, however, gave the imputes to development of this region, and in 1855 the first 'Soo' canal opened Lake Superior to the east

Now the namer, the lumberman and the farmer drove out the fur trader who had held un inspited analytic for 200 years. And the frontier forts and tracking posts situated at strategic points became the great industrial etites of Chaego, Detroit Buffalo, Clee-Reand, and many others. (See also articles on each fake, Furn and Fur Trade and Great Lakes in the Farn-Invert)

GREAT SAIT LAKE. "The Dead Set of the New World' was suply that the bunna body camon and in it als Soltar Beach one see insthers satting unpublic the water with shoothers well out, or lying on the backs with head and toes above the surface. It is estimated that the lesse contains 400 millions tons of common and I. Its from 1 one to even times as saity as the occas, the satiness swiring with changes in level

The lake is in northwesters Ulah, in the region known as the Chert Basin. This wast depression, between the Sierra Newals on the west sud the Rodyl Mountains on the east is an ard region, deprived of rainfall by the high westers mountains and its waters have no orated to the east. Great Sall Lake is the lorgest of its lakes and the bargest west of the Missauppia River Ugal Lake drains stoot through the Joseph River Ugal Lake drains stoot through the Joseph River Ugal Lake drains stoot through the Joseph River Hore, the south, Bear and Weber races an the largest majet so the north and east. There is no click there, as the water evaporates it deposits ever-noreasing quantities of salt and other magerial.

The secrate area is about 2,000 square miles, the length 75 miles, the width 50 miles, and the average depth only from 15 to 15 feet. These figures vary widely with the amount of randful The stream 1809 was 2,100 square miles. From 1900 to 1904 the labs, meanly disappeared mixed of 1 the recoming a still desert in 1924 it was so high that engineering works may rise to 1924 the labs, and the server stream of 1,200 square miles and to a depth of less thing serves feet.

The number of clands also varies with the level of the face. When the acter is for, some of them become peasassian. Antelops Island, the largest, a used for sheep and cattle grants. Several smaller talends are the breeding grounds of guilt, pelicans herons, and commontant Annong the few forms of ile known to commontant Annong the few forms of ile known to the commontant and the contract of the c

Grest Salt fale as a regimant of sourcet Lake Bonneville Thousands of years ago, the original factorized ten times the sext of the present lake to a depth of 1000 feet. Its waters were freeh, for they found an outlet to the north through Red Red. Pass and the Smale Briter, thesee unto the Columba River and the Passife Ocean. High shows the basis of Grest Salt Lake on the mountain sides are still plantly visible the above features of Lake Bonneville—the beaches, deltas, such bare diffs, and promountaines.

Salt is obtained by jumping the like water into saltalow beams and evaporating in the sum. Sodium subjaise is also produced. Across the northern arm of the lake is the Leten subroad outoff. This remarkable engineering achievement includes 30 miles of tractional, and rock fill on the lake but I telliminates the many curves and grades of the old route and solurests the distance by 44 miles (for picture, we Diah). Just west of the lake are the Salt Flats, on which many surnoubble speed records are rande.

THE FORESTED SLOPES OF MOUNT LE CONTE



Mount Le Coute is the highest of three peaks in a long mountain of the same name. A memorahle trip for many visitors to the Smokies is the climb to the summit to watch the sunrise. Patches of cultivated fields may be seen in the hollow at the right. The mountain was named for Prof. Joseph Le Conte, who helped explore the region.

GREAT SMOKY MOUNTAINS NATIONAL PARK. The Cherokee Indians called the mountains of their ancestral home "Great Smoky" because of the blue-

gray haze that veils their rounded summits. Even in brilliant sunlight a pure blue color bathes the distant views, deepening to purple in the shadows of the clouds. Color plays an important part in the beauty of these mountains in Tennessee and North Carolina. In the early summer entire mountain sides flame with pink, rose, and purple rhododendron. The first touch of frost in the fall sets the forested slopes ablaze with yellow, gold, and crimson. And the evergreens on the upper ridges are never greener than when they wear their winter's mantle of snow.

The national park, created in 1930, straddles the crest of the mountains from north to south along the boundary between Tennessee and North Carolina. It is about 54 miles long and 19 miles wide. Since it is within a day's journey of more than half the nation's population, this region of beauty and cool summers has become one of the most popular of the parks.

The Great Smoky Mountains are the highest of the ranges in the Appalach-

ian system (see Appalachian Highlands). Within the boundaries of the park 16 peaks rise to more than 6,000 feet. The summits of Clingmans Dome (6,642 feet), Mount Guyot (6,621 feet), and Mount Le Conte

Appalachia was elevated, and its rocks were folded and combne tight. The mountain re the region.

Appalachia was elevated, and its rocks were folded and compressed. Then ages of erosion by wind and water carved them

into their present gentle and rounded contours.

Botanists say that this region is the original home of our present-day eastern vegetation. Almost un-

touched by the hand of man, with abundant rainfall (nearly 100 inches in a year) and fertile soil. plant life has developed in greater variety than anywhere else in the temperate zone. About 150 species of trees have been found. All Europe has fewer than a hundred species. Here are the largest virgin hardwood and red spruce forests in the United States (202,000 acres) There are perhaps 2,000 species of higher plant life. Many make their finest growth in the Smokies, becoming giants of their kind -tulip trees nearly

(6.593 feet) are popular objectives of hikers and horseback riders. At Newfound Gap (5.043 feet) a broad parking plaza gives motorists the opportunity to enjoy a majestic view. A seven-mile drive known as the Skyway extends from Newfound Gap to within half a mile of the top of Clingmans Dome. The rocks exposed in the Great Smoky Mountains are among the oldest in the earth's history. They are part of the ancient land mass known to geologists as "Appalachia." From Appalachia came the sediments which were deposited in the shallow seas to the west and later formed much of the interior land surface of the United States. During several mountain-making movements



Laurel Falls, above Fighting Creek Gap, foams through a jungle of rhududeudron. In early summer masses of ruse-pink hlussums provide a colorful setting.

diameter of nine feet, a wild grape vine whose main stem is five feet in circumference, laurel shrubs 40 feet high.

Occasional treeless areas on the rounded mountaintops, locally known as "balds," are covered with grass

and shrubs. They may be due to anevent windfalls fire or old Ind an camp sites which destroyed the trees From these open meadows may be obtaine the best views of the surrounding mountains. Acres of rhododendron laurel agalea and mystle blanket the lower slopes and the deep ravines cut by rushing streams. The growth is so impenetrable that these areas are known as alleks or hells. At the neak of their bloom in May and June the mounts na are in lescribably beaut ful

Animal life also is abundant. The Chicago Arademy of Scences has collected more than 50 species of mammals and a great variety of bir is reptiles and amphibians. Large game such as bear and deer is increasing under park lan a vl ich prohibit hunt ng

Scattered through remote little valleys and bottom laids are clear ings where mountain fam lies till hve in self-aufficient privitive fash on Most of them have been moved out of the park but a few hold life leases from the go ern ment Our contemporary ancestors as they have been ralled these mountain people are descen dants of English Scotch and Ir sh settlers who made the r homes in the cover and hottoms of the Smokies before the Revolutionary War Isolated for generations they have kept alive the speech the ballads and the customs of 17th an 1 18th century England Many of the piace names in the mountains reflect their picturesque speech-Long Hungry Ridge Chunky Gal Mountain Charlie's Bunion and Shuckstack Gap The r log cabins their gristmills their artistic weav mg with its ancient traditional patterns their wood working and

other homecraft products are be ng preserved as a memorial of a Vanishing culture

GREBES (grebz) The young grebe is a true water haby When he has pecked his way out of the egg he finds himself on a rait like nest floating among the reeds on the edge of a pond For a few minutes he looks over the edge of the rait and then down he goes swimming with all the skill of an adult. But the young birds are weak and the parents often carry them on their backs. The chicks ride under the wing coverts with only their bright-eyed heads exposed At the slightest alarm the parents festbers completely hide them The old birds will even dive with the little brood under their wings

Hell-dner and nater witch are popular names of the grebe for its skill in diving is indeed uncanny Swiftly and atlently it vanishes under water to come ur far away among the protecting rushes It also has an odd way of tipp ng over backward without leaving a r pple until all but the bill is submerged

On the water grebes look like ducks but they may he dist aguished by their pointed bills short wings and almost complete absence of tail On land they are extremely awkward. The legs are placed so far back that when they walk they carry their bodies upright like penguins. Sometimes they wriggle along on their belies I ke seals Unlike most diving birds, their feet are lobate that is the toes are united only at the base each having asparate membranous flans Their shanks are flattened to bladelike thinness. In flight the trailing feet act as a rudder as the tail does in other birds. They I are glossy black or brown sh black upper parts black or white throats and white



under parts The neck is long and the head of the male is ruffed or crested in the breeding sesson Holboell's eared and horned grebes have chestnut coloring on the head and neck and on the sides of the under parts They feed on fish crawfish and water bug. In winter they desert their reedy ponds and sloughs for more open water and may sometimes be found far out at sea

Grebes form the family Colymbians of the order Colymbia former Bx of the 20-odd known spects are in North Amnetca Moss widely d stributed is the p ed billed grebe or dabch ck, which is found throughout North and South America (for pacture in colors see Burds). The horned and Hollocal s greber range throughout North America, breeding in Cacada and the north of the United States The western and exted grabes range cast to North Dakots and lows end ng in the northern part of the r range. The Mexican (or Least) grobe ranges from southern Texas to Panama.

## WHERE EUROPEAN Civilization Was BORN



Typical of Greece Is This Village of Stone Houses Perched on a Hilltop Amid Cypress Trees

GREECE. More than 25 centuries ago European culture had its beginnings in Greece. For nearly 400 years this small peninsula was the center of ancient art, literature, philosophy, and science. Then the lamp of learning passed to other lands and Greece fell into obscurity. In a later section of this article you will read about the glory of ancient Greece and its contributions to our civilization. Here we are concerned with the nation that rose again in 1829 after centuries of alien rule.

We shall see how difficult it has been for a people long oppressed and unaccustomed to self-rule to establish a stable government. We shall observe, on the other hand, how ready they have been to join in fighting fiercely against foreign enemies through a long series of conflicts culminating in the second World War.

### A Sea-Girt Land of Peninsulas and Islands

Under a sunlit sky the rugged Greek peninsula stretches southward into the blue Mediterranean.

Coastal islands hug the shore, some so close as to form practically a part of the mainland. From the eastern side of the peninsula chains of islands extend across the Aegean Sea and form steppingstones to the coast of Turkey. To the south and east, the large islands of

Crete and Rhodes stand as bastions (see Crete; Rhodes). In the extreme north Greece merges into the continent, spreading eastward over southern Macedonna and into Thrace.

The heart of Greece is the deeply indented southern extremity of the peninsula, which reaches down like a stubby hand with crooked fingers. This hand, now called Morea, is so nearly cut off by water from the rest of Greece that in ancient times it was named Peloponnesus (Pelop's Island). A canal dug through the four-mile-wide Isthmus of Corinth now severs Morea from the upper peninsula.

### Rugged Mountains Rim the Small Plains

Down the western side of the entire Greek peninsula runs a massive chain of mountains, a continuation of the southern Alps. From this backbone, called the Pindus Mountains, spurs run to the coasts and thrust out into the sea forming the numerous promontorics that give Greece its jagged shape. The Greek islands themselves are the tops of mountain

are the tops of mountain spurs that have sunk below sea level. The rivers of Greece are short and swift, useless for transportation. Their small green valleys opening upon the sea are usually cut off from neighbornic lowlands by sharp ridges.

A broken coastal plain borders the Ionian Sea on

Extent —North to south, about 365 miles; west to east, about 350 miles. Area, about 51,000 square miles. Population (1951 census), Natural Features.—Deeply indepted mainlead account.

Natural Features.—Deeply indented mainland coast, with many small islands, especially Cyclades and Sporades groups (including Dodecanese) in Aegean Sea, and Crete. Four fifths of the surface covered by complicated mountain systems, enclosing many small valleys; (9,784 feet). No navigable rivers.

Products.—Wheat, barley core, and other exactly.

(9,784 feet). No navigable rivers.

Products.—Wheat, barley, corn, and other cereals; currants, grapes and wine; olives and olive oil, figs, oranges, lemons; tobacco, cotton; sheep and goats; iron ore, lignite, magnesite, chromite, lead, emery; textile and leather manufactures, soap, cigarettes.

Cifies (1951 census).—Athens (Athena). the capital. \$65.084:

Cities (1951 census).—Athens (Athenai), the capital, S65,084; Saloniki (Thessalonica), 217,049; Piraeus (Peiraieus), 186,014; Patrai (Patras), 79,014; Volos, 51,144.



ly everyone in Greece lives close to the see—so the C tree and magnified ringed plaint that ile clong the coasts or on il islands agrinkled over the Access and Iouse sees. The rugged interior of the pehindule is aparenty appulated

the west Larger agricultural areas face the Aegean Sea on the east. Here the mountain rioged plains of Thessaly reach north to Mount Olympus the highest point in Greece (9754 ft.) Other fertile valleys he in the northern continental strip con

tinuing eastward into Thrace Greece has only 20 mehes of ramfall a year and most of it comes in winter Summers are sunny hot and dry Granevines and olive trees get underground water through their long roots but isrmers must ir rigate most summer crops. Greece can grow subtropical fruits and flowers because there is scarcely any frost except in the mountains The coolest month has a mean temperature of 47° to 50°. The reasons for this Mediterranean type of chinate are explained in other articles (see Chmate, Europe)

How the

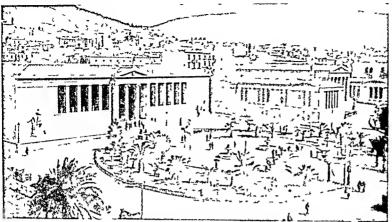
THOUGH only one-fifth of the dry, rugged land can be cultivated, two-People Live thirds of the people live by farming There are only two large cities-Athens the capital with its port Piracus, and in the north, Silombi in Macedonia (see Athena Salopiki) The Greeks are skilled mariners and fishermen and their ships go all over the world The ships carry cargi es for all nations as well as Greek trade

Farm families work hard to grow enough food for themselves and they have btile left to sell. They use crude plows and oven to work the thin stony soil and they reap wheat with sickles. For centuries they have cut trees from the mountains for fuel, and so many hillsides are bare. Heavy winter rains carry the topsoil from the slopes and flood the plains creating unhealthful marshes New trees and shrubs cannot spring up to replace the forests because hungry goats

mp off every new shoot With no great rivers or large-scale irrigation proiects, the Greeks must draw water from wells for there summer crops Usually a donkey plods in a circle working a crude water wheel On the more prosperous

farms a gasoline engine does the pumping The farmers cultivate even the smallest patches of poor soil On many mountainsides they have built stone walls to hold the soil level in terraces On some of the small densely populated islands tiny terraces are built up to the very tops of the

### MODERN BUILDINGS PRESERVE THE CLASSIC TRADITION

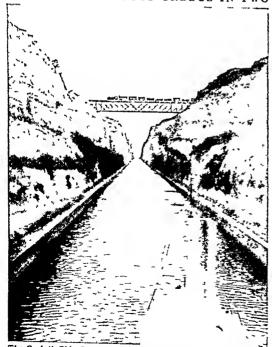


The influence of the classic style can be seen in these public buildings of Athens, built of gleaming marble. To the left stands the National University, and to the right the Academy of Science and Art. Behind the University rises Mount Lycabettus.

hills. The plains have an air of ease and luxuriance. But even here the average farm contains only about ten acres of arable land, and of this the peasant must allow some to lie idle each year to recover its fertility. Agricultural methods are primitive and the yield per acre is low.

The whitewashed farm cottages are built around a square which is the center of the social life of the village. Here men gather in the coffeehouse to

A SHORT CANAL CUTS GREECE IN TWO



The Corinth Ship Canal, 72 feet wide and 4 miles long, makes an island of southern Greece. Here we are looking through the canal westward from the side of the Aegean Sea.

discuss politics, and women meet their neighbors at the well or fountain, where they come to draw water or to wash their clothes. The fields provide wheat and corn: the gardens, beans and other vegetables. The groves furnish olives and olive oil; the vineyards, wine; and the flocks, milk, fresh sheep's cheese and salty goat's cheese, as well as wool, and goat's hair. Fish largely takes the place of meat in the peasant's dict. Wherever the soil is favorable tobacco is grown for sale. Often there is a surplus of olive oil to take to market or seedless grapes that can be dried and sold as currents.

Because of the practise of including a bit of land in a daughter's dowry, the farms have been broken up into small fields that often lie widely separated. A whole family will sometimes travel miles on mules and donkeys to tend their small vineyard or olive grove or struggle up a distant mountainside to sow or reap a field. Sometimes they camp out for days Grain is planted in the autumn and by May is ripe for harvesting. During the hot summer the plains are parched and the shepherds take their goats and hardy sheep to the cooler uplands, where they must travel constantly in search of the sparse pasture.

A People Proud of Their Past

The peasants have a quality of resignation that comes from their struggle with a niggardly soil, but they have also the gaiety of a people satisfied with simple pleasures. There is much singing and dancing and story-telling. The men are proud of their past—of their heroic struggles for hierly in the 19th and 20th centuries as well as of their heritage from ancient days. Reminders of the great classical age lie all about them, in the matchless Parthenon at Athens and in the temples and ancient cities that have been unearthed by archeologists. Later periods in their eventful history are represented in Roman remains, ruins of castles built by the Crusaders, splendid Byzantine churches, and scores of medieval monasteries.

The people belong to the Greek Orthodox Church, which became separated from the Church of Rome in the 11th century (see Church, Christian). They celebrate many saints' days and the important feast days—particularly Easter, which is a day of great rejoicing. On Easter eve the people flock to the churches. At midnight the priest lights a candle to signify that Christ has risen, and its flame is passed on quickly to the candles of all in the congregation. As the people go home to feast on the roast lamb, fish, and eggs they have not eaten during the long weeks of Lent, they greet one another with

the words Christ is risen! and are answered 'Truly He is risen

Occasionally one still sees in Greece a young man who bears a startling resemblance to an ancient statue of a Greek god but the major ty of the people today are of mixed blood. The Gre ks themselves eame down from the north in ancient times and a nee then successive waves of invaders and conquerors have moved into the peninsula - Romans Bulgars Slave Albanians and Turks Nevertheless the population shows remarkable unity. The various peorles have adapted themselves to the Greek way of life and pract cally all speak the Greek language

Industries and Foreign Trade

Greece is one of the poorest countries of Europe Although the majority of the people are engaged in agriculture it does not raise enough grains for its own needs. Much of its manufactured goods mu t also be imported for the country lacks the c al and hydroelectric power necessary for a large in dustry The profits from Gree, tramp steamers and liners help to pay for the exce s of imports over exports but ance the nation was first formed it has had to struggle with an ever increasing foreign debt

The chief exports are Turk sh tobacco currents and olive oil Mineral resources are exported on effy as raw materials-iron ore iron pyr tes raw man ganese chrom tes lead ore and emery Lignite is mined and used as fuel. The chief products of the factories are text les cigarettes ci emicals obve oil eauned goods and wine

War of Independence and Struggle for Tetrhory For more than 2 000 years from the time of Alex ander the Great to the third decade of the 19th cen tury the Greeks passed from one master to enother The last of these conquetors was Turkey which esPRIMITIVE FARMING ON THIN SOIL



te on a main ton a poors In the case technique

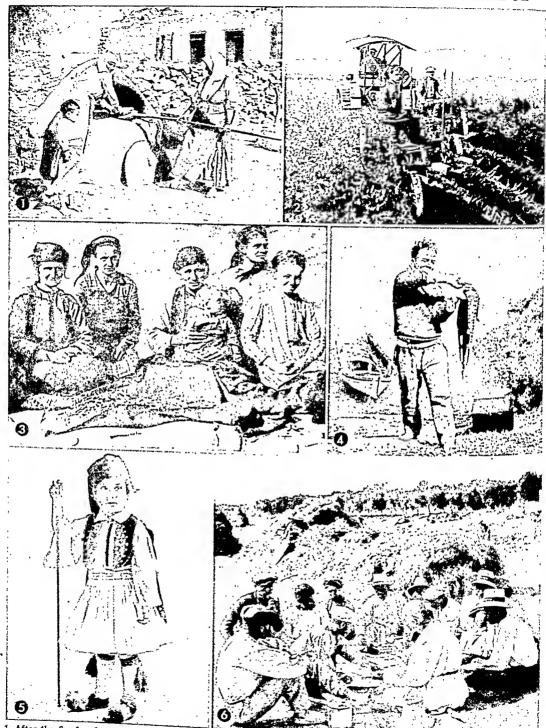
tablished its dominion over the Balkan Peninsula during the 15th century At the beginning of the 19th century when the power of the Ottoman Empire was waning revolts flared up in the outlying provinces

In 1871 the Greeks rose in arms in a war of independence Russia was interested because the Greek Cathohe church was also the state church of Russia and Russia had for years claimed the right to protect the Greek Christian subjects of the Turkish Emp te Numerous volunteers from Europe joined the Greeks-the Engl sh poet Lord Byron among them-and fought the troops of the sultan with varying success. In 1827 the Turkish fleet was destroyed at Navanno by the comb and British. French and Russ an fleets but there the joint action ceased. The next year Russia marched an army into the Balkans and took Adrianople In the peace of Adranople (1829) Turkey granted independence to a large part of the Greek peninsula. but millions of Greeks still remained under Moslem rule



IN AN OLD OLIVE GROVE

## GLIMPSES OF PEASANT LIFE IN SUNNY GREECE



1. After the fire has been raked out, the women bake their bread in this clay oven. 2. Two men ride the plows behind a modern tractor. 3. Peasant women and children wait for customers at a roadside market. 4. This fisherman's family will corps of evzones. Notice the embroidered jacket, the stiff white skirt (called the fustanella), and the slippers with great points to protect the toes on rough mountain trails. 6. Farmers pause for lunch; some are still wearing old-fashioned tunics.

In 1832 after ser ous divorders and the murder of the provis onal president of Greece the Great Powers provided Greece with a long-Prince Otto son of Louis I of Bayana Otto ruled after the German manner with a crowd of German adv sers and the Greeks in 1862 revolted and denosed him. In the

Prince George of Denmark took the throne and began h s 50-year re m The nation now started alongstruggletoev tend its boundaries and I berate the m I hons of Greeks at Il under al en role. In 1864 Great Britain ceded to Greece the Ionian Islands which had been a republic un ler Britsh protect on s ace 1815 The k ngdom was further en larged by the add: t on of Thessaly on the north between 1881 and 1897 Crete which had revolted from Turk ish rule, was not allowed by the Pow ers to become part of Greece unt 1 1913 In the Balkan Wars (1912 13) the albed Balkan States thor oughly defeated Turkey end Greece gs ned a broad strip of terntory on the north nelud ng a great part of anc ent

following year

kan Pen nsula) In 1913 K ng George was assass nated by one of his subjects and his son Constant ne ascend ed to the throne His queen was sister to

Macedonia (see Bal

the German Ka ser When the first World War broke out in 1914 the sympathies of the royal family were on the side of the Central Powers But Prime M mater Venizelos a most brilliant statesman who had p loted his country through the Balkan Wars favored the cause of the Alhes (see Venizelos) In June 1917 King Constant ne was forced to abdreade in favor of his second son Alexander Greece then declared

ar and fought th the Alies on the Macedonian front (See World War First )

In the peace acttlement Ven zelos obta ned by the Treaty of Sevres (1990) much new territory for Greece unclad ag Eastern Thrace Smyrna and a large ad sacent dist et n As a Minor But n December 1970 VISITORS ARE HAULED UP IN A BASKET

after the death of Alexander from the b te of a pet mon key tle Greeks defied the All es by restor ng Constant ne to the throne The All es therefore deel ned to support the Greeks n en focus ther ne ela ms n Asia M no -clams which n fact exceeded those prom sed n the peace settlement

In 1921 the Greeks rashly advanced upon the Turks and were over whelming y route l Smyrna was burned and Greece filled w th facit ves But the fight wasanoth ngcompare i to the nvason of refugees that was to come By the terms of the Treaty of Lausanne (1923) the Greeks lost Esstern Thrace and all clams n As a M n or The Tu ks then ins sted that all Greek Christ ans n Turkey and all Moslems n G eece (the except on were few ) must be returned to the rown countries even though they and ther famles had been lay ng abroad for centu



ries Thismeantthat 1 300 000 Greeks came home from Turkey several hundred thousand Armenians also fled to Greece in fear of the r persecutors and about 353 000 Moslems returned to Turkey Although this uproot ng of some two milhon people was accompanied by great suffer ing the new comers to Greece who were mostly skilled farmers, tobacco-raisers weavers and perfumemakers brought new life to the regions they settled

Most of them made their homes in western Thrace and in Greek Macedonia. Thus these regions, long fought over by the Balkan countries, became largely Greek in population.

The Short-Lived Hellenic Republic

The disaster in Asia Minor dethroned Constantine a second time. He abdicated in 1922 and his son,

WAR DESTROYED THEIR HOMES



In April 1939, Mussolini invaded Albania, on Greece's northwest border. He assured Greece he would respect its integrity. Until this happened, Metanas had been drawing close to the fascist nations, Germany and Italy. Now he quickly accepted British and French pledges of aid if needed. Greece remained neutral when the second World War broke out in Sep-

tember. On Oct 28, 1940, Italy without warning launched an attack on Greece from Albania. But the Greek army, though poorly equipped, drove the Italian forces back deep into Albania. Early in 1941 Great Britain sent troop and equipment to aid the Greek and Germany had to intervene to save the Axis.

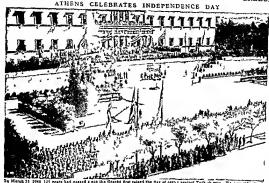
Hitler first conquered Yugoslavia in a lightning campaign Then he sent his panzer divisions racing down the Vardar Valley to Saloniki (April 8, 1941). On April 30 the Nazis occupied Athens On May 20 their air-borne infantry took Crete. The British and New Zealand forces were driven from Greece. King George II fled to Cairo with his cabinet. Later the Greek government in evile set up headquarters in London.

George II, became king of the Hellenes The real power, however, lay with Gen. Theodore Pangalos. The army soon demanded that the new king also abdicate, and George left Greece in 1923. In 1924 the parliament proclaimed Greece the Hellenic Republic and declared the king deposed A plebiscite confirmed the action of parliament. Pangalos became premier in 1925, and in 1926 made himself dictator. For a brief period he regulated everything, down to the length of women's skirts. Then a revolution (1927) drove him out of power and into prison.

After a period of terror, peaceful elections took place. The republican Venizelos again guided Greek affairs from 1928 to 1932. He put the country's finances on a firm basis, encouraged industry, and signed a treaty of friendship with Turkey (1930). But bitter royalist opposition continued. In 1932 the royalist People's party, though a small minority, once more came into power. The republicans, fearing the government might recall the king, launched a revolution in 1935. The government put down the revolt, and George II returned to his throne. The next year (1936) the royalist leader Gen. John Metavas became premier. He persuaded King George to dissolve parliament. From 1936 until his death in 1941 Metaxas ruled the country as a virtual dictator. He exiled Liberal and Communist leaders, suppressed trade unions, censored the press, and set up a youth movement patterned on that of Nazi Germany.



The second World War left 400 000 Greeks homeless. The upper picture shows farmers putting np a new stone house Meanwhile they sleep in the near-hy grass hut. In the lower picture a mother and her children stand outside their rude lean-to. The mother has just haked a loaf of bread in an ontdoor oven.



fist of cere t against Turk sh rule. He a crowde stand to n ce shret on of the day

The Germans yithdrew from Greece in the early iall of 1944 (see World War Second) In October he Greek government in exile (without the king) rearned to Athens under Briti h protection

ATHENS

The government faced formudable p oblems In lustry was pract cally at a standst li Railways and indges had been wrecked and millions of homes destroyed Eighty per cent of the Greek mercantile marine had been jost. A wild inflation made the currency pract cally worthless The people were half starved and impoverished Malana and tuberculos's were rife Allied relief (UNRRA) brought in food cloth ing and med cines But reconstruction could make little headway for immediately after hieration Greece was plunged into c vil strife

Communists Try to Selze Athena During the second World War Greek underground

forces resisted the Nazis. The Allies supplied them with arms At first they were unorganized Gradually Communists gained control of ELAS the army of the Greek Liberation Front (CAM) Democratic leaders commanded a small resistance group LDES

The Communi is plotted to seize the government as soon as the enemy left. In December 1944 ELAS made a bold move on Athens British troops opened fire and the coup d état failed Members of ELAS retreated to the mountains where they formed guernila bands They lived off the countryside looting villages and driving thousands from home Greek troops could not rout them from their rugged hideouts

Meanwhile Greece tried to establish a stable govern ment In 1946 the nat on held its first elect on in ten years The conservative Populist party won minority Communist party refused to vote Arch beshop Damaskinos the king a regent retired in favor of George II who ascended the throne for the th rd t me On April 1 1947 George died He was succeeded by his brother Paul I

Peace Treaty Gains and Civil War

Though Greece had suffered greatly in the second World War, it gained little The Italian peace treaty of 1947 gave Rhodes and the other Dodecanese Islands to Greece The treaty also granted to Creece \$105 000 000 as reparations from Italy

The Communist problem in Greece became an inter national issue. In the summer of 1946 open civil war broke out between the guerrulas and government forces Greece charged that its Commun at-dominated Balkan neighbors gave refuge to Greek guerrillas and countred them Greece appealed to the United Nations which sent a commission to investigate. The majority of the commiss on supported Greek charges But Russia upheld its Balkan satellites and vetoed action by the United Nations (see United Nations)

The Communist plan seemed clear Soviet Russ a was continuing the impenalist aims of carnst Russia trying to extend the Russian sphere of influence south to the Mediterranean To prevent Greece from fall ug under Russian domination Great Britain had been giving financial and military aid to the Greeks

But early in 1947 Britain, hard pressed at home, announced it could no longer afford to give aid.

The "Truman Doctrine" Helps Greece

Greece appealed to the United States. On March 12, 1947, President Harry S. Truman asked Congress to help preserve the freedom of Greece. Truman declared it was necessary to the security of the United States to aid any nation whose independence was threatened by force of arms. Congress endorsed this "Truman Doctrine," and granted Greece a loan of \$300,000,000 for military aid and reconstruction. The American Mission arrived in Athens in July.

The Communists had gained control of much of the wild mountainous country of northern and central

Greece. Their swift raids and house burnings drove more than 400,000 homeless refugees into crowded cities. Greece was near collapse.

American officers trained the Greek army. Late in 1947 the Communist attack threatened to engulf the nation. The United States increased its economic aid and improved Greek defenses. The Communists surrendered in 1949. The European Recovery Program helped the Greeks to rebuild homes in the shattered north. At the United States demand Greece liberalized its government, and women voted for the first time in 1951. In 1952 Greece joined NATO. It joined Turkey and Yugoslavia in a defense pact in 1953. (For Reference-Outline and Bibliography, see Europe.)

# The Stirring Days of Ancient Greece

WHY DOES the modern world still take an interest in ancient Greece? Why do we continue to study and discuss in great detail what happened 25 centuries ago on a rocky, half-barren peninsula in the Mediterranean no larger than the island of Cuba?

A visit to the Greece of today gives no answer. Neither does a mere review of the political and military events of ancient history. We concern ourselves with the Greece of old because Western civilization was born there. Because there, between 600 and 300 B.c., a handful of men dethroned the blind and arbitrary fates that had seemed to rule the world. They conceived instead the ideas that the universe is orderly and that by the use of their reason men can come to understand it. Accordingly they investigated and developed the principles of reasoning and applied them to every problem they could think offrom astronomy to politics and from mathematics to the fine arts.

In due course the knowledge gathered by the Greeks was passed on to the Romans, who applied it in developing the legal system and the engineering skill on which their great empire was founded. Then, as Christianity spread, its moral teachings found support in the orderly wisdom of the Greeks, and the two blended into a tradition and way of life under which western Europe became the center of progressive civilization.

The Beginnings of Greek Culture

The story of ancient Greece takes us back to about 1500 B.C., when wave after wave of barbarian invaders swept over and destroyed the towns and cities of the Aegean basin, and then gradually built up a new civilization upon the ruins. You may read elsewhere about the early Aegean civilization with its gold and bronze and pottery and paintings and its great palaces at Cnossus in Crete and at Mycenae and Tiryns on the mainland (see Aegean Civilization). The Greeks who swept down from the north and overwhelmed these cities were simple nomadic herdsmen—a branch of the Indo-European race that had for centuries been drifting to the east and west from their home in the grasslands east of the Caspian Sea (see Language and Literature). The first wave of

invaders were the fair-haired Acheans of whom we read in Homer. The Dorians, who composed the second wave, came perhaps three or four centuries later, subjugating in their turn their Achean kinsmen. Other tribes, the Aeolians and the Ionians, found homes chiefly on the islands and coasts of Asia Minor.

Life of the Early Wanderers Something of the culture of the Aegean civilization these Greek-or, as the Greeks called themselves Hellcnic-invaders must have absorbed when they settled down and intermarried with the people they conquered. But, being still in the nomadic stage themselves, they were not fitted to come into the whole heritage of a city civilization. So of the earliest stages of the Greek settlement we know little, for these invaders were neither builders nor writers But we may imagine them moving southward from their pasture lands along the Danube, driving their herds before them, bringing their families and primitive goods in rough oxcarts, stopping in one place just long enough to plant and harvest one crop These families settled down in the pasture lands of the peninsula, gradually took up farming, and little by little formed communities ruled by kings and elders.

At this point we can begin to picture them. For the background of the 'Tliad' and the 'Odyssey' is the background of the Age of the Kings (see Homer). We see the Acheans living very simply, a race devoted to warfare. Their weapons and their songs are the only splendid things they have, except for the gorgeous robes and the beautiful jewelry and metal work they bought from Phoenician traders (see Phoenicians). The palace of Odysseus is built of wood, a hall about a court. In this hall they cook and eat. Sometimes it gets very smoky, for there are no chimneys. And the bed of Odysseus is no work of the cabinet-maker's art, but a very rude affair wrought by Odysseus himself out of a living clive tree.

The City-States and Their Far-Flung Colonies
In the 'Iliad' we see Greeks from many cities—
Sparta, Athens, Thebes, Argos, and the rest—all
more or less united to fight their common foe Troy in
Asia Minor (see Trojan War). In historic times the
Greeks were again able to work more or less together



This mep shows the hef e sed d some of an

when the power of Pers a th extened them all But Greece never became a nat on The mly patriot sm the Greek ever knew as loyalty to hs ty The seems part cularly strange to us an vadays because ther ctes vere so emall Except Athens probably no G eek c ty state counted mo e than 20 000 e t zens

Just as Europe today a chopped up nto nations n stead of being a fey large political units as North America s so on a smaller scale and ent Greece was d vided by to mo nta n ranges And even the pla as thus enclosed were n many cases subdivided contain ng several a ty states and su rounding its ac opoles o ctadel The e first topped nac ess be rocks or mounds a e characterist c of G eece and we e fi st used as places of refuge From the Counthian sthmus ro e the lofty Ac ocounthus f om Att ca the Ac opol's of Athens f om the plan of A golis the mound of T ryns and lofter still the Lan sa of Argos On these rocks they built the r temples and the r king s palace and the r houses clustered about the base

Only n a few cases did the city-state push ts hold ags beyond very as row I mits Athens held the whole pla n of Att ca and most of the Att e vil lagers were Athenian ct zens Argos conquered the pla n of Argol s Sparta made a conquest of Laconia and part of the fert le plan of Me senia the con que ed people he ng subjects not et zeus Thebes sitempted to be the ruling c ty of Bosotia but never qu te succeeded (see Thebes)

Sm lar c ty-states were found through all the Greck world, which had early flung its outposts throughout the Aegean bas n and even beyond There were Greeks in all the slands of the Aegean n Thasos famous for its gold mines in Samothrace

Imb os and Lemnos long occup ed by Athen an colonists n Lesbon here bu ning Sappho loved and sung and Soyros sland of Achilles n Chios Samos and Rhodes as well as n the nearer-lying Cyclades - so called (from the Greck word for circle ) because they fo med a ci le around the sacred sland of Delos-and to the south n the island of Crete The we tern shores of As a M nor were fruged with Greek colonies reaching out past the Propont's (Sea of Marmara) and the Bo porus to the northern and southern shores of the Europe or Black Sea. In Air a there were among others the colony of Cyrene and the tracing post of Naucrat a in Egypt & cly too was colonized by the Greeks and the e and n southern Italy so many col mes were planted that this region came to be known as Magna Grace a or Great Greece Pres ng farther still the Greeks founded the city of Ma ha now Mar scalles in Gaul

The Lack of Pol tical Unity

Separated by barr ers of sea and mounta n by local made and realousy the various adopendent city states never even con e ved the idea of forming a pol cal unit of the G eck-speaking wo ld except as some powerful state embarked on a carcer of conquest and attempted to make itself m stress of the rest Many nfluences made for unity - a common lan guage a common religion a common I terature sim far customs the religious leagues and fest vals the O vone c Games - but even n time of foreign nya s on it was with the greatest d fliculty that the c t es were induced to act together

Various Types of Government

The government of many of the cty-states notably Athens - passes through four stages as we



A Greek mother walks with her children on a stone-paved street. Notice the doll in the little girl's arms, bought from the peddler siting on the curb. Observe also the drinking fountain at the left. In the hackground rises the hill known as the Acropolis, crowned by the Parthenon and other temples. The painting is by a French artist, André Castaigne.

watch it from Homer to historical times. During the 8th and 7th centuries B.C. the kings disappear, monarchy gives way to oligarchy, that is, the rule of the few. The power goes over to the wealthy landowning nobles—the "Eupatrids" or well-born. But the rivalry among the nobles and the discontent of the oppressed masses are too great, and soon a third stage appears.

This third type of government is known as tyranny. Some Eupatrid suddenly seizes absolute power—usually by obtaining the favor of the people and promising to right the wrongs inflicted upon them by the other land-holding Eupatrids. He is known as a "tyrant," which among the Greeks was not a term of reproach, merely implying one who had seized kingly power without the qualification of royal descent. The tyrants of the 7th century were a steppingstone to democracy, or the rule of the people, which was nearly everywhere established in the 6th

and 5th conturies. For it was the tyrant who taught the people their rights and their power.

By the beginning of the 5th century B.C. Athens had gone through these stages and emerged as a democracy—the first democracy in the history of the world Between two and three centures before this the kings had made way for officials called "archons," elected by the nobles, and the aristocratic form of government was established. About 621 BC an important step in the direction of democracy was taken, when the first written laws in Greece were compiled from the evisting traditional laws. This reform was forced by the peasants to relieve them from the oppression of the nobles. But this code-which was so severe that the adjective "Draconic," from the name of its compiler Draco, is still a synonym for "harsh"did not give sufficient relief. A revolution was averted only by the wise reforms of Solon, about a generation later (see Solon) But Solon's reforms only put off the fatal day, and in 561 BC. Pisistratus, aided by the discontented, made himself tyrant. With interruptions, Pisistratus ruled for more than 30 years, fostering commerce, agriculture, and the arts, and laying the foundation for much of Athens' future greatness. His sons Hippias and Hipparchus attempted to continue their father's power, but

one of them was slain by two youths, Harmodius and Aristogiton, who henceforth lived in Greek tradition as themes for sculptors and poets. By the reforms of Clisthenes, about 509 B.C., the rule of the people was firmly established.

Very different was the course of events in Sparta (see Sparta), which had now established itself as the most powerful military state in Greece. Under the strict laws of Lycurgus (see Lycurgus) it had maintained its primitive monarchical form of government with little change. Nearly the whole of the Peloponnesus had been brought under its iron heel, and it was now jealously eyeing the rising power of its democratic rival in central Greece.

During this period the intellectual and artistic culture of the Greeks centered among the Ionians of Asia Minor. Thales, called "the first Greek philosopher," was a citizen of Miletus. He became famous for predicting an eclipse of the sun in 585 B.C.

Suidenly there loomed in the east a fundamental which threshead to sweep any the whole promising structure of the new European crylaristical Persis, the great Asiatic world-empire of the chy bad said dealy been awakened to the evistence of the free peoples of Greece by the said who the Athenane had sent to their oppressed kinemen in As a Minor The diministic story of how the scanfa forces of the Great drawn the story of how the scanfa forces of the Great draw back the enormous Persian armaments is told in the article on the Persist My

How Athena Rose to Power

From this momentous conflict Athens emerged a blackened rum but yet the nichest and mo t powerful state in Greece. She owed this position

"hiefly to the shrewd policies of her statesman Themistocles who had seen that naval strength not land strength was beneeforth to be the key to power Whose can hold the sea has command of the attuation he said He persuaded his fellow Athenians to build a strong ficet-larger than the combined ficets of all the rest of Greece-and to fortify the harbor at Piracus Tlia fleet became the in strument by which the Persians were finally defeated at the battle of Salamus and also by which Athena made herself mistress of the Aggean For within three years after Salamie (480 B c ) Athens had united the Greek cities of the Asiatic coast and of Aegean islands into a confederacy (called the Delian League because the treasury was at first on the island of Deloa) for defense against Persa and in another generation this confederacy had become an Atheman Empire

Almost at a stroke Athera was transformed, from a provincial city to an imperial expital. Wealth beyond the dreams of any other freek state flowed into her coffers—tribute from subject and allued states custome duties on the flood of commerce that proved through the Pirsess and re-ceuse from the Attie of re-more as foreigness streamed in the determines. The projection mercent fourfold or more as foreigness streamed in the determines the projection of the property of the Circum and commerce and the content of the projection of the commerce of the flower of the projection of the comtent four-duties as never before in lastory. Painters and eculptors well in beautifying Athers with the works of their genum—trans

ures which even today battered and defaced by time and man still remain among the wonder works of human still. The period which stands out as one of the most remarkable and brilliant in the world's history, reached its cultimation in the age of Pencles 469–150 or (see Precise). Under the stans has been also been also been also been also also also free institutions the ottage hope of Athens attained a higher average of intellectral interests than any other sought before or since

But we must remember that a very large part of the Athenian population were not citizens for the Athensan state rested on a foundation of slavery Two fifths (some authorities say four fifths) of the population were slaves Slave labor produced a large part of the wealth that gave the citizen the time and money to pursue art and learning and serve the state Slavery in Greece was a premiar institution. When

a city was conquered for phabitates were often sold as alexe. Kolanyung boys and men in barbanan that us non Greek tands and even in other Greek tales was another stady source of supply If a slave was well-educated or could be trained to a craft he was easy despected of And a slave always had a chance of obstunung has freedom for quite frequently



outraines) the name of the one he wented beneated or estrected form an inhibitally present and recognizing Arist des gets the great me is were his even same on the chet. It is hed nothing against him he said he was simply lired of hearing him on led the Just (ree Arist des)

has master would let him work for him and this gave him a chance to save money. After he had bought has freedom or had been set free by a grateful master he became sumply a metro—resident alien Mater he became sumply a metro—resident alien Mater he he had been supply a metro—sendent alien Mater sent in gange to the sulver muses at Laurium where they worked underground by the dim light of little charced lumps in narrow correlation.

#### Daily Life in the Periclean Age

Though the citazens of Athens were thus set free from much of the drudgery of life, we must not get

the idea that they reveled in luxury. "Plain living and high thinking" might have been their motto, for the standard of comfort was very low in comparison with our own. The houses were of sun-dried brick. built two stories high along narrow winding streets, into which refuse was thrown instead of being properly drained or carted off. The people ate two meals a day, each consisting of bread, perhaps a broth of beans and pulse, with wine and sometimes fruit to wash it down. Fish with the bread was thought to make a remarkably fine meal. Olives and olive oil were largely used; honey took the place of sugar, and cheese was often eaten in place of meat, but butter was practically unknown. Athens can be nearly as cold in winter as Philadelphia, yet the only heat in the houses was a brazier or dish of burning charcoal. There was no plumbing, nor were there chunneys, and the smoke from the stove in the tiny kitchen sometimes preferred wandering around the house to going out the hole in the roof provided for it. There were no windows on the first floor, but in the center of the house was a broad open court—as you will find in Spain or in the Oriental countries today-with the men's apartment, the women's apartment, and the tiny cupboard-like bedrooms clustered about it. The second story sometimes had a window or two looking down upon the street.

But the real life of the city was out of doors. The men spent much of their time talking politics and philosophy in the agora or market place, excreising or lounging in the athletic fields, performing military duty, sitting in the Assembly or the Council of 500, taking part in the numerous state festivals, or doing jury duty-there were 6,000 jurors on duty all the time in Athens, for all the allied citics were forced to bring their cases to Athens for trial. Daily salaries

were paid for jury service and service on the Council which made up a considerable part of the income of the poorer citizens. The women staved at home. attending to the affairs of the house and spinning and weaving the wool for clothing. They never acted as hostesses when their husbands had parties, and were only seen in public at the theater-where they might attend tragedy but not comedy-and at certain religious festivals.

### The Peloponnesian War (431-404 B. C.)

Such was life in Athens in the heyday of her glory, before the jealousy of Sparta and other independent Greek states and the discontent of the subject states of the Athenian Empire flamed up into a war that broke the power of Athens. The long struggle, called the Peloponnesian War, broke out in 431 B c. It was a contest between a great sea power, the Athenian Empire, and a great land power, Sparta and the Peloponnesian League.

The plan of Pericles at the beginning of the war was not to fight at all, but to let Corinth and Sparta spend their money and energies while Athens conserved both. Therefore he had all the inhabitants of Attica come inside the walls of Athens and let the Peloponnesians enter the plain of Attica year after year and ravage as they would, while Athens, again without losses, harried their lands by sea. But Pericles reekoned without the dangers of overcrowding. The plague broke out in Athens and killed one fourth of the population, including Pericles himself, and left the other three fourths without spirit and without a leader. The first phase of the war ended with the supremacy still undecided.

Aicibiades and His Evii Influence

Almost before they knew it, however, the Athenians were whirled by the unscrupulous demagogue Alci-

CLINGING CLOTH CARVED FROM THE SOLID STONE\_



These three figures from the ruins of the Parthenon in Athens, and now in the British Museum, are generally supposed to present the finest treatment of drapery known to the sculptor's art. Muthated as they are, the exact meaning of these figures remains a mystery. They are commonly called 'The Three Fates', but another interesting theory is that the reclining form is that of Thaless "the Sea," lying in the lap of Gaia "the Earth," and that the exquisite flowing lines of drapery represent the waves breaking npost the shore. According to this theory, the figure at the left did not helong to the group.

### RELICS FROM HOMES OF THE ANCIENT GREEKS





The toy horse on wheels is made of terrs totta. The jars on its back are like those carried by real horses for taking provisions to and from market. The pretty jug with a apost is a feeding.

bottle. The bronze lamp has a handle for carrying A wick burned in the spout and oil was poured to from the top (Courtesp of the Metropolden Museum of Art.)

biades nephew of Pericks into the second phase (414-401 s c) Wishing for a brillient military career Alchhades persuaded Athens into a stupendous expedition against Syracuce a Connthan colony in Stuly The armada was destroyed in 413 s c, and the centries were seld that her

captives were sold into slavery
This disaster scaled the fate of Athens Those alhed

Ans gassete senied the fate of Athers: Those since time about the Aegaen that har remained fastbill now described to Sparia and the Spartan armes had Athena under suege: In 405 or the whole remaining Athenian fleet of 180 truemes was captured in the Hellespont at the buttle of Aegorpotamia. Besieged by land and powerless by sea, Athens could neither ramss grain nor import; and in 404 nc the Athenian Empire came to an end 'The fortifications and long walls connecting Athers with Prisass were destroyed, and Athens became a vassal of trumphant Sparia.

The End of the Greek City States

Sparts and so fire deves they should be supported by keeping Survives and to maintain its suppersion. The custom for the maintain is suppersion. The custom together with highest, interest of democracy made its domination unpropular. At the histite of Evectra in 371 to the Thebnas under their gifted commander Epatemondels broke the power of Sparts Thebnal is described by the support of the skill of Epatemondes. When he was killed in the battle of Mantinean 362 sr. Thebes really suffered defeat in spite of its vectory. The age of the powerful city states was at an end, and a prostrated Greece invited a conqueror.

Such a conqueror was found in the young and strong country of Macedon Yung just to the north of classical Greece I In King Philp, who came into power in 300 no. p had find a Greek education and, seeing the weakness of the distincted interest made up in rand to possess the Greek word! Demostheres (see Demostheres) saw the danger than Philps sough and by a series of fary species are not possible and any as one of fary species are not experienced. Any and the series of the series of the series and a squared Persia. But Philps was too strong for them and at the battle of Chaerona (328 n c) established his leadership Before he could early his conquests to Asia Minne, however, he was kulded and his power fell to his son Alexander, then not quite 20 years old How Alexander firmly established immed! throughout Greece, and then overthere the vast power of Persa, building up an empire that embrared nearly the entire known world, is told in a separate article (see Alexander the Great) The Hellenistic Age and Roman Googuest

The three centures that follow the death of Alexander are known as the Hellemston age, for their products were no longer pure Greek but Greek pitts the characteristics of the conquered nations. It was a time of greak wealth and splenfor Art, scenes as the conformal to the confo

This age came to its oud in another conquesic—tak. of Rome On the field of Cynocephalae ("dogs' heads), in Thessaty, the Roman defeated Maccolanu 1972 for and gave the Greek cites their freedoms as allies. Even so the Greek cites their freedom as allies. Even so the Greeks caused Rome a great deal of trouble, and were taught their lesson by the burning of Cornth in 168 so and their reduction to vasashage Athens above has reverted and allowed a certain amount of freedom, and to its schoole went many Romags Cierco among the Cierco among the constraints.

What the state of the state of

The Heritage Left by the Ancient Creeks

The glorious culture of the Greeks had its beginmings before the rise of the city states to wealth
and power, and survived after the Greeks had lost

their independence. The men of genius who gave their stamp to the age seemed to live a life apart from the tumultuous politics and wars of the period. They sprang up everywhere, in scattered colonies as well as in the peninsula. And when the great creative age had passed its peak, Greek artists and philosophers were sought after as teachers in other lands, where they spread the wisdom of their masters.

What were these new ideas for which the world reached out so eagerly? First among them was the determination to live by the light of reason, to follow the truth wherever it led. In their sculpture and

architecture, in their literature and philosophy, the Greeks were above all else reasonable. "Nothing to excess" (meden agan) was their guiding principle, which the Roman poet Horace later interpreted as the "golden mean."

Their art was singularly free from exaggeration. Virtue was for them a path between two extremes-only by temperance, they held, could man attain happiness. Believing in a balanced life of the mind and body, they had time too for play, and played magnificently (see Olympic Games). Even in the most troubled times they kept their joy in life, refusing to surrender to pessimism.

From Homer to Aristotle This many-sided culture

seemed to spring almost full-grown into being. Babylon contributed a little astronomy and Egypt the rudiments of geometry and medicine; but the genius of the Greeks owed little to these ancient civilizations. As we have seen, their culture had its beginnings in the settlements on the coast of Asia Minor. Here Homer sang of a joyous, conquering people and of their gods who, far from being aloof and forbidding, were always ready to come down from Mount Olympus to play a part in the absorbing life of mankind (see Homer; Mythology; Trojan War). In Asia Minor too philosophy was born. Here in the 6th century B.c. Thales, Heraclitus, Democritus, and other nature-philosophers speculated on what stuff the world is made of. Thales also contributed to the science of geometry, which was further advanced by Pythagoras in a distant colony in

southern Italy (see Pythagoras). In the 5th century B.C. with the rise of Athens as a wealthy democratic state, the center of Greek culture passed to the peninsula. Here the Greeks reached the peak of their extraordinary creative energy. This was the great period of Greek literature, architecture, and sculpture, culminating in the "Golden Age" of

Pericles (see Pericles; Architecture; Greek Art: Greek Literature). Philosophers now turned their thoughts from the study of matter to the study of man himself (see Education). Toward the end of the century Socrates ushered in the most brilliant period of Greek philosophy, passing on his wisdom to his pupil Plato, who in turn handed it on to "the master of those who know," the great Aristotle (see Socrates; Plato; Aristotle; Academy).

Progress of Science in the Heilenistic Age Alexander spread Greek learning with his conquests. The three centuries following his death (323 B.C.) are called the Hellenistic Age, as distinguished HOW THE GREEKS DECORATED POTTERY

from the true Hellenic period. The city founded by Alexander at the mouth of the Nile-called after him Alexandria-now became the intellectual capital of the world (see Alexandria). In literature and art the

Hellenistic Age was imitstive, looking to the masterpieces of earlier days for inspiration; but much brilliant work was done in science. Archimedes in Sicily put mechanics on a sound footing and Euclid established geometry as a science (see Archimedes; Eratosthen≊ Geometry).

made maps and calculated the earth's circumference This exquisite decoration of an ancient Greek vase was pleced together from broken fragments. In this type of work the background was painted black and the figures delicately sketched in with black lines over the natural red of the clay. (sec Earth). Aristarchus put forward the hypothesis that the earth revolves around the sun. But Ptolemy clung

to the belief in a central earth with heavenly bodies circling around it; and his works remained standard throughout the Middle Ages (see Ptolemy).

How Greek Culture Survived The Hellenistic Age came to an end with the establishment of the Roman Empire in 31 B.c. The Romans borrowed from the Greeks their art and science as well as their philosophy of stoicism. When Christianity grew and spread it was inevitably influenced by Greek thought. Through the period of the barbarian invasions Greek learning was preserved by the Christians in Constantinople and by the Mohammedans in Cairo (see Mohammed). Later its light shone again in the Middle Ages with the founding of the great universities in Italy, France, and England. During the Renaissance it provided an impetus for the rebirth of art and literature (see Renaissance). Modern science itself rests on the Greek idea of man's capacity to solve his problems by rational methods. In almost every phase of life today the quickening impulse of Greek thought can still be seen among the peoples who inherited this priceless legacy. (For Reference-Outline and Bibliography, see Ancient History.)

#### The GLORIOUS ART of GREECE and How ROME Helped Transmit It to Us

REEK AND ROMAN ART Greek Gert owes a great deal to natural conditions Greece is one of the fairest ands in all the world nowhere else has Nature brought together the tharm of mountains and sea and sky in more beautiful combination. The firm lines of mountains and crags outlined in the crustal clear our evainst the brilliant blue of the sky must have helped to mapire that love of simple graceful line, of perfect propor tion and symmetry of strength and serenity, which is characteristic of Greek architecture and sculpture

Responding to the beauty that was everywhere about him, the Greek aspired to make hie raind and his body harmonious and beautiful as Nature It is impossible to measure how much the sculptor owed to the Greek emphaas of physical culture and athleties And Nature endowed the Greeks in another amportant way. for many of the islands off the coast, notably Parce, are almost solid blocks of white marble, while in Attica the cuarnes of Mount Pentehous

and Mount Hymettus

which invites the sculptor a chisel But we must not think that cold white marble alone satisfied the Greeks They used color in both their sculpture and their architecture, though time has almost entirely washed away the reds and blues and other bright hues with which they touched up their work, and we can only imagine what the effect must have been when those works were in their prime The work of the great Greek painters also has disappeared, and lives only in what the ancient writers tell us about it and in the work of their disciples of a later day Polygnotus in the 5th century, we are told was renowned as a draftsman while the great painters of the 4th century-Parrhasius, Zeuxis, and

also yield an abundance of the beautiful white stone

Fortunately many Greek vases have been preserved in tombs and in other sites uncovered by modern excavators Simple end graceful in form, these vases show in the earliest specimens geometric designa, then figures of men and gods, painted in black against

Apelles-were famous as colorists



THE poet tells us that "A thing of beauty is a goy More than 20 conturies ago the ancient Greeks unspired by lofty ideals of Beauty Truth, and Goodness which in their simple and harmonious view of life were enseparable created works of art which have never been equaled Worn and defaced by time, these art works are still so beautiful that to look upon them is an inspiration. Many men have spent the best part of their lives searching for these beautiful fragments and thus helping to piece out the story of Greek art Something of this wonderful story - the conditions under which Greek art was born, its development and the creat masters and their work-is told in this article It tells. ton, how when Greece fell her beauty held captive the practical-minded Roman conquerors, how, under her influence, the Romans developed an art of their own. and also helped to transmit to later ages the unsurpassed close of the art of the Greeks

the natural red of the clay or as later became more common with the figures left red against a black background From these vases we ere able to form some idea of what Greek painting was like end they give us further examples of that wonderful feeling for form and line which made the Greeks supreme in the field of sculpture

We must not imagine that Greek art sprang fullblown into being The ancestors of those artists who were to create the most perfect forms of sculpture that the world has ever seen were a semi barbarous people. when they began to

migrate into the peninsula that is now Greece. and centuries rolled by before their cenius flowered into the art forms which have been the admiration of all later times Though they must unconsciously have been influenced by the art of the Aegean peoples whom they overwhelmed no relation can be traced between the well wrought figures and reliefa of Tiryns and Mycenae and Cnossus. and the crude bemnings of Helleme sculpture in

the 7th century s c When

we see bow primitive and stiff are the Greek statues of that archate period, and compare them with the masterpieces of two centuries later, we cannot but marvel at the rapid development of Greek art, when once it got fairly under way Through the Phoenicians the great trafficking race of the ege the early Greeks came in contact with the art of Babylonia, Assyria, and Egypt They borrowed many of their decorative forms from these peoples, but transformed them by the fires of their own arsword dragua

Greek religion, Greek love of beauty, and a growing spirit of nationality were finding fuller and fuller expression But it took a storm like the Persian invasion (490-479 BC) to arouse the young virile race to great achievements Having driven out the Amatic invader, the Greeks suddenly grew, in the 5th century, to full stature What the Persians had destroyed the Greeks set to work to rebuild Their poets sang the glones of the new epoch, and Greek genus, as shown in the great creations et Athens, came to full strength and beauty. It was then, under Pericles, that the Athenian Acropolis was restored and adorned with the matchless Parthenon, the Eicchtheum, and other beautiful buildings. (See Acropolis; Athens.) There were beautiful temples in other cities of Greece too, notably that of Zeus at Olympia, which we know from descriptions by the ancient writers and from a few fragments that have been discovered in recent times. (For Greek architecture see Architecture.)

The 5th century was made illustrious in sculpture also by the work of three great masters, all known to us in some degree by surviving works. Myron is famous for the boldness with which he fixed moments of violent action in bronze, as in his famous 'Discobolus', or Discus Thrower, which we know through a fine copy now in Munich. The 'Doryphorus', or 'Spear Bearer, of Polyclitus, who also worked in bronze, was called by the ancients the Rule, or guide in composition, because it was believed to follow the true proportions of the human

body more perfectly than any other work.

But the greatestname in Greek sculpture is that of Phidias (see Phidias). It was under his direction that the sculptures decorating the Parthenon were planned and executed, and some of them may have been the work of his own hand. His great master-

pieces, the colossal gold and ivory statue of Athena, which stood within this temple, and the similar one of Zeus in the temple at Olympia, have disappeared. But we can form some conception of his great genius from the remains of the sculptures of the pediments and frieze of the Parthenon, now preserved in the British Museum and known as the Elgin Marbles, from Lord Elgin who brought them from Athens in 1801-12. These sculptures are the greatest works of Greek art that have come down to us. Another famous work that is believed to belong to the school of Phidias is the 'Aphrodite' of Melos, commonly known as the Venus de Milo, a marble statue now in the Louvre in Paris. Although some think it belongs to a later date, its perfect proportions, its calm dignity, and noble serenity typify the qualities which we associate with Phidias

The works of Phidias were followed by those of Praxiteles, Scopas, and Lysippus. Of Praxiteles, "the sculptor of the beautiful," we have what is believed to be an original work, the statue of 'Hermes with the Infant Dyo-



Compare this wonderful statue of the god Area (Mars) with the crude figure at the right, and you will appreciate what progress the Greeka made in art in the course of a few centuries. This statue, the famous 'Villa Ludovisi Mars', is believed to be copy of an original by Scopas or Lysippus. It is an excellent example of the characteristic "restraint" of Greek art. To show the violent character of the God of War, the aculptor merely extended the breadth of his nostrils, aa men dilate them in anger. Playing at his feet is the little God of Love.

AN ANCESTOR OF THE VENUS DEMILO



This quaint old left is an example of reflexible from such crude beginnings developed the art which created the Venus de Milo.



nysus This is the only statue that can be dent fied with one of the great G eek masters Most of those sculptors it must be remembered are known to us only through cop es of the r work by Roman

artists The figure of Hermes at once strong and act ve and graceful beautifully proport oned with a surface of exquisite texture the well possed bead

and the fare expressive of nobility and sweetness is beaut ful beyond description. The child which is held in the left hand is reaching out to grasp something perhaps a bunch of grapes—held in the missing hand of Hermes The so-called Satyr or Faun of Prauteles which suggested Hawthorne's Marble Faun is probably the work of another sculptor of

### FIGURES FROM THE WEST FRIEZE OF THE PARTHENON



eek Art reached its climax in the Parthenon Here we see three of the figures in the frieze on the west front, where the grit anathenaic Procession" is represented as starting Here the young soldiers are mounting or preparing to mount, one of the oping to farten his sandal. Notice the spirited action of these classic steeds of stone. The Greeks did not think it appropriate horses to walk quietly in a procession. To do instice to the occasion they felt horses should prance and rear. for horses to walk quietly in a procession.

the same school. Praviteles' conceptions are less lofty and dignified than those of Phidias. but they are full of grace and charm. Scopas carried further the tendency to portray dramatic moods, giving his subjects an intense impassioned expression. Lysippus returned to the athletic type of Polyclitus, but made his figures lighter and more slender, combining manly beauty and He was at the strength. height of his fame in the time of Alexander the Great, who, it is said, desired that Lysippus only should portray him. How far this age had advanced in the expression of graceful motion through the modeling of the figure and the skilful handling of the drapery can be seen in the celebrated 'Winged Victory' of Samothrace, now in the Louvre.

As time went on, Greek art lost much of its simplicity and ideal perfection of form, its serenity and restraint, but it gained in intensity of feeling, in expressing physical suffering and anguish. It had also become



THE YOUNG AUGUSTUS A fine example of Roman portrait sculpture

more realistic, portraying not only ideal types of men and gods but portraits of individuals, and not

only Greeks but barbarians a well. One of the most famous works of the period after the death of Alexander is the 'Dying Gaul' sometimes called the 'Dying Gladiator'. In the 'Laocoon' group, which dep'r's the father and his sons crushed to death by deadly serpent, we find the extremity d physical torture as represented in sculpture. To this period belongs also the famous 'Apollo Belvedere', a statue c' very great beauty, though " has lost something of the vigo. and the calm power of the more heroic days. (For picture, see Apollo.)

The Art of the Romans From early times the Romans had felt the artistic influence of Greece, and when in 146 B.C. Greece was finally conquered by Rome, Great art became inseparably interwoven with that of Roze "Greece, conquered, led her

conqueror captive"—this is the poet's way of expresing the triumph of Greek over Roman culture. But it is a mistake to suppose that the Romans were merely imitators, or that Roman art was merely s decayed form into which Greek art had fallen

To a large extent the art of the Romany was a development of that of their pred cessors in Huly, the Drussens, who, to be sure, had learned much from the Greefs (see Etrussens). Now were the Romans themselves entirely without originality Though their stratute forms were, for the most part, bornoved, they expressed in fitting, especially choroved, they expressed in fitting, especially offensive the surface of the surface of

In the 2d century a c the Roman senerals. began a systematic plunder of the esties of Greece, bringing back thousands of Greek statues to grace their triumphal processions. Greek artists flocked to Rome to shore m the patronage that was so lavishly bestowed. owing to the rich conquests made as the Roman power was extended The wealthy Romans built villas, filled them with works of art in the manner of our modern plutocrats, and called for Greek artists or Romans mapped by Greek traditions to point their walls and decorate their courts with sculptures The ruins excavated at Pompes and Herculaneum show us how fond the Romans and their neighbors in Italy were of embelishing not only their houses, but the objects of duly use, such as household utensils, furni-

ture, etc. (see Yompus). But with the Romans art was used not so much for the expression of great sed noble ideas and emotions as for decorrison and ortentation. As art became fix-inonable, it lost much of its spartual quality. As they borrowed many thements of their relegon from the Greeks, so the Romans copied this statues of Greek gods and goddenses. The Romans were fasting in great magnatures. Even in one of the few ideal types which

they originated, the 'Antinoia', the Greek-stamp is immatakable in one respect, bowever, the Roman sculptors did show originative, they produced many ugorous related portrait statues. Among those that have come down to us are a beautiful last of the status of the satural status of the satural status of the same empery, and bust of other status of the same empery, and bust of other sames safetamen. All these have a history as well as an artistic value. So, too, have the related which adors not bettuctures as the larch of Titus and the Column of Trajan, communicating great events in these

emperors' reigns In painting—though here too, they learned from the Greeks-it seems probable that the Romans developed more originality than an aculpture Unfortunately, as in the case of the Greeks, the great masterpieces of ancient runting no longer syst, but we can learn much from the murs! paintings found in houses at Pompen, Herculaneum, and Rome The plessing coloring, which in many of the paintings still remains fresh and vivid, and the freedom and vigor of the drawing, would seem to indicate that even from these ancient days Italy was the home of painters of great talent Portrait painting especially flourshed at Rome, where back street corner ertists became so common that one could have his portrait painted for a few cents were more remarkable for their realistic than their artistic ment, as we know from several

surroung examples.
Although the set of Rome loses in comparson with that of Greece, still it commands our admiration, and we owe the Romans a debt of gratitude for helping to transmit to us the art of the Greeks, who were their great



Insignate Column is at once a subline expression of Routin and makes the set meating abundance feet high. Rounding ground the without go to Roune once of these days for will see it because the set measure the extense of the suspers Tream. Portious aft sprently in 25 time are some 25 000 forces does maked the profit of the suspers Tream. Portious aft sprently in 25 time are some 25 000 forces does maked the solution in a gridge war, the eakse of the papers were buried, this relief are shown on each side of our pit pressure stays of this, which paper better by Treated with the figure of St. Peter.



Typical of the spirit of Greece is this painting, by Alma-Tadema, showing the poet Sappho, seated at the left, listening to the music of a lyre. The beauty of the fragments which we have of her work fully justifies the esteem in which the Greeks held her.

reek language and literature. If Solon J and Pericles could wander back from the Elysian Fields and sit down in some café of modern Athens they would probably be surprised to find how easily they could read the morning paper. Of course, it would take them a minute to focus their eyes on the print, so much smaller than anything done with the reed pen of their day, and they would find the shape of some of the letters changed or standardized. They would find many new words, and perhaps they would accuse the journalist of carcless grammar. But all the same the literary Greek of today is perfectly intelligible to anyone who knows his Greek of 2,500 years Their greatest trouble would be in ordering breakfast and talking with people about them. For many words concerning the intimate things of daily life were borrowed during medieval and modern times from the Italians, Turks, or other neighbors, and the pronunciation is so changed as to make modern spoken Greek almost unintelligible to one acquainted with only the classical tongue.

Greek nevertheless should be considered not as a dead language but as a living one. The Greek schoolboy can read the literary masterpieces of 2,500 years ago far more easily than we can read Chaucer. And the Greek language is living not only among modern Greeks, but in the up-to-date speech of America and the rest of the world. When we want to make a new word for a new thing we are likely to borrow from the Greek. For example, "osteopathy," "phonograph," "telegraph," "telephone," "automobile,"

"periscope," "photograph," and scores of other words that have found their way into our dictionaries to name modern inventions and developments of science are formed directly from old Greek words. Nor are we indebted to Greek only for these "made" words. Many are also woven into the very warp and woof of our language, as is told in the article on English Language. So, if you know Greek, you can often see at a glance the meaning and pronunciation of a word that would otherwise make you gasp—"anthropomorphic," for instance, which comes from the Greek words for "man" and "form," meaning therefore "man-formed" or "manlike."

But even if Greek were as dead as Sanskrit from the viewpoint of modern life, still it would be worth while for us to study it. For of all the languages of the world, the most beautiful is Greek as it was written 20 centuries or more ago. It was graceful and harmonious, full of light and shade and color, subtlety and music. It could pile words together into compounds with as great abandon as German does nowadays—only the words were prettier to begin with—or it could sail along with little words like a lightly moving skiff.

Moreover in this superb tongue was written one of the most wonderful literatures of all time. Of this literature we can only get half an idea even through the most careful translations. Poetry is always hard to translate, but Greek poetry loses more than perhaps any other, since English often takes two or three times as many words to say the same thing. A prose

translation of Homer is therefore clumsy and a translation in English verse is inadequate Neither gives any idea of the simplicity and resonance and movement the mevitability which never becomes

monotony The lyrics are even harder to translate though Swinburne and Tennyson have produced free renderings of great beauty which give the English

reader some notica of the qualities of

the originals Greek prose also much by loses translation for Greek is a so much subtler instrument of expression than English that you would need a foot note to almost every word of a translation to explain the exact

shade of meaning that your Greek author miended The Greek DOT ticles for instance little words only a letter or two long and amounting only to a slight gesture of the hand or the flicker of expression on a person s face must be translated in English by some such an kward word

as moreover translation makes things tedious where the Greek expresses them compactly This of course is because

Greek is a rather A single word of highly inflected language perhaps no more than two ayllables in Greek may

become a whole sentence with us The oldest Greek literary works that we have are the Ibad and the Odyssey of Homer which the world still acknowledges as the most splendid exam ples of epic or narrative poetry People weed to wonder how first poems could be so perfect and so great as the Iliad and the Odyssey' The explana tion is of course that these were not the first poems They come from an age that was already richm folk poetry-hymns to the gods and marriage hymns and lays telling the deeds of ancient heroes In that age however the Greeks had no writing and cf all the

songs that the wander ng bards carried from city to city and recited from memory only the Homerto noems survived to be written down The only exceptions are a few of the so-called Homeric hymns-the invocations to Apollo or some other god with which it was customary for the singer to prelude his recita tion of the Homeric stories themselves The article

on Homer tells you about these thrilling tales of adventure and also indicates where in these volumes you may find some of these stories retold

From a shightly later per od we have the poems attributed to Hestod Hestod is a much more definite figure than Homer He hved at the wretched hamlet of Asera near Mount Hel con in Boeotia probably in the 8th century h c and drew many faithful pictures of the dull poverty stricken country life he knew so well Homer and Henod together made a sort of hible for the Greoks-Homer telling the story of the heroic past and Hesiod dealing with the practical realities of daily his setting forth homely maxima



and precepts for the farmer in his Works and Days and in the Theogony pec ng together the old legends to form a systematic account of creat on and the gods

With the 8th and 7th centuries we come to the beginnings of the historical period. The old ways of life were giving way to new Commerce discovery colonization political change widened the horizon of the Greeks and quickened their feeling and imag mation To express the thoughts and feelings aroused by this fuller and more interesting life new literary forms were invented-all still in verse however for prose had not begun to be used as a literary medium Instead of the rapid flowing hexameter ( a line of six measures) so well adapted for narration the poets

TO Greece we owe the love of Science, the love of Art,

1 the love of Freedom. The Greek genius is the

European genius in its first and brightest bloom. From a

vivifying contact with the Greek spirit Europe derived

that new and mighty impulse which we call Progress. If

we reckon up our secular possessions, the wealth and

heritage of the past, the larger share may be traced back

people to show the world what real freedom and real

civilization were. And they brought, not only Politics,

but Art and Science and Literature of every kind to a

higher pitch than any other people ever did without bor-

bearing fruit in the world ever since they were first ut-

tered. In some special sciences, the work done by the

Greeks remains a basis of study to this day. In Greek

literature we have the fountain-head of all Western

literature."-R. C. Jebb.

"The thoughts of the great Greek thinkers have been

"The Greeks, we should never forget, were the first

to Greece."-S. H. Butcher.

rowing from others."—E. A. Freeman.

of the 8th and 7th centuries used the meter called "elegiac," which lent itself to direct self-expression on almost any theme—patriotism, war, mourning, or political reflection—and the "iambic" meter, which was especially adapted to pointed personal utterance, usually of a satirical nature. With these forms are associated such names as Archilochus, Mimnermus.

and Solon, the great lawgiver of Athens. More varied, flexible,

and complex than these forms of verse was the type which the Greeks called "melic" and we call "lyric," because it was sung to the accompaniment of the lyre or the flute. With a free rhythmic structure. capable of the most subtle variation, Greek lyric reached a degree of artistic perfection never surpassed. Religious and processional hymns, odes of victory. dirges, wedding songs,

drinking songs, love poems, were poured out by artists of exquisite skill, most of whom are known to us only by fragments. Greatest of them all was Pindar (518-446?), whose magnificent odes yield the scholar a pleasure which alone is enough to recompense for the labor of learning the Greek language. Sappho, who wrote about a century before Pindar, is generally esteemed as the greatest of all women poets. Her "every word," a famous critic says, "has a peculiar and unmistakable perfume, a seal of absolute perfection, and inimitable grace."

As the Greeks invented the epic and lyric forms, and brought them to a perfection which has never been surpassed, so too they invented the drama (considered as a literary form) and produced the masterpieces which are still reckoned as the drama's crowning achievements. In the crowded glorious age which followed the repulse of Persia (490-479), the awakened national consciousness of Athens found expression in a series of superb tragedies which have never been equaled except perhaps by a few of Shakespeare's. The story of how the simple choral songs and dialogues performed at the festivals of the god Dionysus flowered into the majestic tragedies of Aeschylus, Sophocles, and Euripides, and how each made improvements in the dramatic form, is told in the article on Drama.

The religious character which was impressed on Greek drama by its origin was never lost. It was acted only at the festivals held in honor of Dionysus, and wealthy citizens were chosen to hear the expense of costuming and training the chorus as a public and

religious duty. Attendance at the performances was an act of religious worship, and in the time of Pericles the state itself gave poor citizens the price of admission to the great open-air Theater of Dionysus (2.5). Theater) that none might be debarred by poverty. All the greatest poets of the day competed for the

prizes which were offered for the best plays.

The earliest of the three great Attic writers of tragedy was Aeschylus, who was born in 525 B.C. and was present at the hattles of Marathon and Salamis. He wrote between 70 and 90 plays, of which 7 remain. Many of his dramas were arranged as "trilogies," that is, groups of three related plays. The 'Oresteia' (story of Orestes), consisting of the 'Agamemnon', 'Choephon' and 'Eumenides', is the only trilogy that

has survived from ancient times. The 'Persae' is a song of triumph for the defeat of the Persians. The 'Prometheus Bound' is a colossal rendering of the legend of the superhuman benefactor who stole fire from heaven for men (see Prometheus). For rugged power, sublimity of idea, and ethical grandeur Aeschylus stands without a peer.

For some 16 years, between 484 and 468, Aeschylus carried off prize after prize, but in 468 his place as the favorite poet of Athens was taken by a man some 30 years younger, Sophocles of Colonus (496-406 B.C.). Sophocles' long life covered practically the whole period of Athens' greatest glory. He won more than 20 victorics at the Dionysia, and produced more than 100 plays, 7 of which are extant. Sophocles "saw life steadily, and saw it whole." This serenity of attitude together with the supreme skill with which his dramas were constructed, the beauty of his language and the nobility of his characters, give us a sense of majesty and harmony such as we find nowhere else in literature. He was the most Greek of all the Greek poets. His plays have been compared to the Parthenon for their power, self-restraint, and symmetry. The 'Antigone', which is perhaps the most celebrated drama in Greek literature, is typical of Sophocles' work. Its heroine is a model of womanly self-sacrifice, and underlying the whole tragedy is the sublime idea of a higher unseen law ruling the destines of men. Others of his plays are 'Ajax', 'Oedipus Tyrannus', 'Electra', and 'Oedipus at Colonus'.

The third of the great tragic writers is Euripides (480-406 B.C.), who was born on the island of Salamis

-so the story goes--the day of the famous battle against the Persians Although he presented he first play at 20 he did not take the prize until he was 39 and won it only five times in all in sp te of his 92 produced plays The reason for this is that he was a modern among the ancients. He questioned the popular idea of religion and he drew real men and

women instead of gods or demigods or ideal ized human beings of heroic stature this reason Aristotle calls him the most tragic of the poets for his plays heing the most human were also the most moving. The conservatives of his own generation did not approve of 1 m but in later times he was evalted to a place with Aeschylue and Sophocles His playa re more often per ormed on the modern stage than thoe of my other Greek poet Eighteen plays have survived including Alcestis Medea Hippolytus the Tro an Women Orestes

at Aula, and the Bacchae

Electra

Iphigenia

about 448-385 BC) who was for 40 years the great burlesque crit c His comed es are gay fun mak of Athenian life ng about the things of his own day slways from the standpo nt of the con ervative He ridicales the new learn ng in the person of Socrates and savagely lashes Europides who atood for the inquiring innovating attitude that he particularly hated Socialism women's rights the Peloponnesian War the fondness of the poorer citizens for serving on juries now that Cleon had raised their pay to ten cente a day-these and other aspects of current Atheman I fe served as subjects for his stinging sarcasm and boisterous humor Eleven of his plays survine including the Knights, Clouds, Wasps, Frogs Ecclesiazusae (Women in Parliament) Lysistrata and Brds

As always in literary h story Greek prose was late in developing In the 6th century some of the early philosophers formulated their ideas in brief sen tentious prose maxims but the first truly I terary use

of prose as in the History of Herodotus written about the middle of the 5th century (see Herodotus) The theme of Herodotus is the struggle between East and West culminating in the Persian Wars His great successor Thueydides (about 471-396) told the story of the Peloponnesian Wars Thucydides critical use of sources his inclusion of documents his

laborious research into - the roots of events make him the most modern of the Greek historians - the first philosopher of his tory -far removed from the romantic inclusiveness of Herodotus or of Veno

phon (see Xenophon) The 5th century also saw the r se of another prose art the art of oratory with its com panion art of rhetorie which taught the technique of making successful apeaches With the establish ment of democracy in Athena and other Greek cit es the ah l sty to make convincing speeches before the popular assemblies and especially in the law courts hecame of the greatest practical value Litigants were usually compelled to

plead their own cases instead of hiring others to plead for them so rhetoric became part of the ordinary education of the youth and a new profession arose-that of the writer of speeches for men to speak in their own behalf A large proport on of the speeches of the Attie orstors that have come down to us were meant to be used in this way The 4th century was the golden age of oratory made memorable by the polished and artful speeches of Lysias Isocrates Assehmes and the master orator

of all time Demosthenes (see Demosthenes) The same lively curiosity and insat able interest in the spectacle of the universe which led the Greeks to invent epic and lyric verse drama and history also made them the first philosophers Their craving to find a reasoned answer to the riddles of life resulted in the creation of another department of prose literature represented chiefly by the great names of Plato and Austotle Beginning with the 6th century one thinker after another advanced his theory of the



mly the plays of one

ve pitte of depphs a root p har come down to us. The chair of other

min have survived—

home of Aristophanes

pays have been decore ed as re out pears want of which a here ere of the come of the come

GREEK LITERATURE material causes of the universe, of knowledge, and of conduct. Many of the fragments of their teachings which have been preserved in the form of terse epigrammatic statements in prose or verse seem erude and childish to us today, but they serve to remind us how long and toilsome is the road that leads to wisdom. (See Pythagoras.) thinker to lay a really scientific basis for philosophical inquiry was Socrates (469-399 B.C.), whose tireless questioning into the roots of conduct and searching criticism of all traditional doctrines so outraged the orthodox and narrow-minded that he was put to death (see Socrates). He wrote nothing himself, but his great pupil Plato (427-347) perpetuated and developed his teaching in a matchless series of dialogues, packed with fresh and stimulating ideas which have inspired every philosophical thinker since his day (see Plato). Third of the immortal trio of Athenian thinkers was Plato's pupil, Aristotle, the father of science. Aristotle sought to map out nearly the whole field of human knowledge into the various sciences, laying a foundation for all later scientific inquiry. In the history of literature, his work cannot

a series of lively character sketches which have found imitators in every age. With these names the story of classical Greek literature ends, but the Hellenistic age in Alexandria offers us a second rich library (see Alexandria, Egypt). The name that stands out in poetry is that of Theocritus, who wrote exquisite little shepherd dialogues picturing the rural life of his native Sicily. Imitators from Vergil to our own day have tried in vain to recapture the freshness and charm of the pastoral form as Theocritus first used it. Other poets of this age are the lyric poet Callimachus; Bion and Moschus, writers of pastoral verse; and Apollonius Rhodius who wrote the Argonautica, an epic in four books on the quest of the Golden Fleece. Greek prose, too, continued to flourish far into Roman times, and from these later days we have our first forerunners of the novels (see Novel), as well as

rank with the superbly artistic Platonic dialogues,

but in the history of thought he is acknowledged as

"the master of those who know." (See Aristotle.)

Theophrastus, who succeeded Aristotle as head of the

school called the Lyceum, is chiefly remembered for

important works of geography and history. The most noteworthy of these later writers are the historians Polybius, Diodorus Siculus, Josephus, and Appian; the geographers Strabo and Pausanias; the biographer Plutarch, who has given us more general information about antiquity than any other single writer (see Plutarch); the critic Longinus, to whom is assigned one of the best of all works of literary criticism, the treatise 'On the Sublime'; the humorist Lucian, whose 'Dialogues of the Gods', are almost as outrageously laughable as a comedy of Aristophanes; and the two Stoic philosophers Epictetus and Marcus Aurelius, one a slave and the other an emperor (see Epictetus; Marcus Aurelius Antoninus).

and written with variations sufficiently great to care three chief dialects to be recognized, though the differences were never so great as to cause difficulty d communication. The Ionic dialect, the language of Homer and Hesiod, was spoken in most of the Agent islands and on the west coast of Asia Minor. With: few modifications, the Ionic is identical with the Attic, the principal literary dialect, used in the work of the great Attic writers. The Doric, the language of Pindar and Theocritus, was spoken at Corinth and throughout most of the Peloponnesus. The Acolic. in which Sappho wrote, was spoken in Boeotia, The saly, and Acolis (northern Asia Minor).

In various localities the Greek language was spoken

In modern Greece there is a sharp cleavage between the dialect of the people, called "Romaic," and the Lieux language, which represents an attempt to return so in the possible to the standards of classical Greek. The street between the "purists" and the adherents of the popular tongue is still waged with so great bitterness that in 10.1 20 persons were killed or injured in a mass meeting of protest against the proposed issue of a translation of the Gazel into Romaic. The style of most current literature mi journalism represents a compromise between these tax ideals, but the most powerful poetry and fiction are white in the "vulgar" tongue.

GREELEY, HORACE (1811-1872). If it is true that "the pen is mightier than the sword," then Home Greeley, the newspaper man, might possibly be an sidered greater than Grant and Lee or any other geeral of the Civil War. Not only was he the greater molder of public opinion in the period preceding during the war, but he was probably the greated journalist America has ever produced. Because of the importance of his work the poet Whittier called in "our later Franklin."

Greeley was, in his own words, "born in porety cradled in obscurity, and early called from school? rugged labor," but he sought "to convert obsteche into opportunity, and wrest achievement from diculty," and his efforts were successful.

Born in New Hampshire, he learned the printitrade in Vermont, and later joined his parents in western Pennsylvania. In 1831 he went to New Ica with \$10 in his pocket and his clothes in a bunch carried over his shoulder. After several newspep. ventures which brought him much notoriety but little money, he started the New York Tribune, 25 2 Will daily, in 1841.

The success of this paper was immediate, and its circulation soon covered the country from the Atlantic to the frontier of Missouri. In its column Greeley opposed slavery, advocated a high profective tarifi, and aided the temperance movement. At the outbreak of the Civil War he urged the government to refrain from "pinning one section to another to bayonets." Afterwards he was an earnest uploase of the government, and he urged the emancipation the the slaves even before Lincoln was ready for that ster

After the war was over Greeley wished the county to treat the South leniently. To set an example is signed the bond by which Jefferson Davis was gire

# FORECASTING EUROPE'S WEATHER AT A GREENLAND OUTPOST



as freedom. He could not carry the country with him in this stituted however and in 1872 when he was the cand date of the Liberol Republicans and the Democratis against Grant he was desistrously defeated. Borne down by political and domestic missionance of the latter of the latter

fortune he fell til and died Nov 20 1872. In spite of the au cess of the Thomes and the large sum Greeley made on the lecture blatform he was never weathly because he shows under everpoon, sked him for help. He was extremely sample in his habits and exculses in his ories. He is handled in the was to poor that it we the de pair of typestites on the measurement of the minute of mind and his moral courage he was uncurpassed among the mon

of and says of the control of the control of the problem of the brilliant general Nathanad Green is resolved in the brilliant general Nathanad Green is resolved in the control of the con

Greene speedily won the fr endsh p and confidence of Washington under whom the served with dist netion at Trenton Princeton and Brandywon At Washington serguest he accepted at Valley Forge in March 1778, the difficult position of quaternassist to the property of the Beause of the mediling of Congress with the sfigure of his department Green expect has position in 1780, but was shortly afterwards

appointed by Washington as commander of the Army of the South When Greene succeeded Gates in this command he found the army in so wretched a state without disc pline arms or clothing that he could not bring it into condit on for fighting until 1781 As econ as this had been accomplished he began a campaign which in less than a year stripped the English of all their conquests in the Carolinas and Georgia except Charleston in which he penned up the British army for the rest of the war. For this he received the thanks of Congress large grante of land from the Carel has and Georgia and the name of the man who saved the South in the American Revolution GREENLAND Perhaps four fifths of this the largest island in the world is bured under an itecap tlat averages 1 000 feet in depth. The area of Greenland is variously estimated at from 735 000 to 1 250 000 square miles It is more than 1 600 miles long with a maximum width of between 600 and 800 miles Men can live only on the rocky roastal fringe chiefly in the southwest Except for one or two tiny settlements the east coast is uninhabited

The west coast as warm enough to support munical regetation with a few stunded birticles and willows. The Greenlanders who are Eskimons with a matture of European birdou support themselves theight by him, mig saids whates walma bear and five and by find mig for each all but and submon (see Eskimon). Postations and other root crops are grown but even the hard est of grame—barley—will not ripen here and as grown only as fodder for the few goods sheep, and eattle. The bouness are mostly of stone and sed for lamber has to be unported. A few Eskimon build amon globs for the wather or when traveling.

Lying to the northeast of North America and all most wholly within the Arct c Circle Greenland is subject to intense coil terrible blizzards and almost constant fog. Flowing down from Greenland s rey mountains glacers discharge a billion tons of ree



These Greenland Eskimos have efficient craft for sealing and fishing. The kayak has a light frame of driftwood, and a waterproof covering of sealskin. It is decked over except at the center, where a sealskin apron is laced around the fisherman to keep out the water. His spear and harpoon fit into loops on the deck and his sealing line is coiled on the raised platform before him.

into the sea every year (see Glacier). Many of these enormous icebergs are carried down into the lane of ocean travel, where they are a constant menace to navigation in spring and summer (see Icebergs).

The Greenlanders have to import much of their food, clothing, and other necessities. The most valuable export is cryolite, a scarce mineral mined nowhere else. It is used in separating aluminum from its ores and in making glass and enamelware. Other exports are whale and seal oil, fish products, eider down, and skins. There are schools in all the settlements and nearly all the people can read and write.

At the end of the 10th century Eric the Red, eviled from Iceland, sailed to the southwestern coast of Greenland and founded a colony. He apparently gave it the inviting name of Greenland to attract settlers from Iceland. In 1261 the colony came under Norwegian rule. Communication with Norway ceased in the 15th century and Greenland became lost to the world until the close of the 16th century, when it was rediscovered by English explorers. In 1721 Hans Egede, a missionary, began a modern colonizing movement. When Norway and Denmark dissolved their union in 1814, Greenland was not mentioned, and so Denmark kept it. In 1933 the World Court disallowed Norway's claims to the east coast. In recent decades Greenland has been a favorite field for explorers and a step-

pingstone for exploration of the north polar regions (see also Polar Exploration; Peary). After the Germans ravaded Denmark in the second World War, the United States took responbility for the island's people and defen-

European weather is influenced by meteorological conditions in Greenhard Secret German weather stations were hunted out and destroyed. The United States established stations of its own and several military airfields. After the war, rule of the island was restored to Denmark; but the United State recreased and improved its weather that thous and military airfields. Populated (1945 census), 21,412. Included at some 500 Danish officials, trad in miners, clergymen, and teachers.

GREGORY, Pores. Sixteen popes, two of them among the greatest the church has produced—have borne this honord name.

GREGORY I, called the Great (540. 604), was a Roman, of old family and great wealth. He became a Benedictus monk in a monastery which he himself endowed. Britain attracted his interest when he saw English boys sold as slave in Rome. Soon after his election as pose, in 590, he sent St. Augustine to Eriland as a missionary. He repeatedly be to defend Rome against the Lombard Gregory left many writings on mon-

teries and missionary work. He supervised the comming and editing of the church music known as the Gregorian chant. In restored form this is the official liturgical music of the Roman Catholic Church today. It is generally believed that Gregory did much of the editing himself, particularly on the music for the management of the ablest of the popes, and after the death was made a saint.

GREGORY VI (died 1047) earned a high reputation for learning and uprightness. He was deposed, however, by a council held by Emperor Henry III on its ground that in a time of confusion he had obtained hoffice by improper means.

Gregory VII was the mighty Hildebrand (Inral 1020-1085). After being the power behind the three for a quarter of a century, under five popes, he was chosen pope in 1073. His pontificate is memorable to the begunning of the great Investiture Conflict with the Emperor Henry IV of Germany. His purpose was to create a sort of international league with the pope its head. A Catholic historian sums up Hildebrand ideas in these words: "Seeing the world sunk in wackedness and threatened with impending ruin, and believed that the Pope alone could save it, he conceived the raid design of a universal theoeracy, which should embrace every kingdom of Christendom, and of whose policy the Ten Commandments should be the fundamental prince.

ciple Over this commonwealth of nations the Popeway to preside The spiritual power was to stand related to the temporal as the sun to the moon imparting a light end strength without however destroying it or depriving princes of their sovereignty

After a violent conflict Henry IV was obliged to humble himself barefoot and fasting before the pope at Canossa (1077) But the struggle soon recommenced Henry attacked the pope in Rome itself . Only the a d of the Norman Robert tauscard permitated Gregory to ret re from Rome to Naples He died at Salerno shortly after saving I have loved matter and hated inquity therefore I die in exile

GREGORY IX (pope 1297-41) is memorable chefly for his conflict with the Emperor Frederick II Grea-ORY XI (pope 1370-78) was e French churchman who inst tuted many reforms and transferred the papacy back to Rome from Avignon where it had been for 70 years GREGORY XII (pope 1406-15) upheld the rights of the Roman nontiffs arginst the Avignonese entspope Benedict XIII in the time of the Great Schism Gregory VIII (pope 1572-85) established the New Style calendar in place of the Jul an calendar (see Calendar) Gregory XVI (pope 1831-46) en couraged learning end founded the Egyptian and Etruscan museums in the Vati on

GRENFELL SIR WILFRED THOMASON (1865-1940) In 1892 a young English doctor named W fired Gren fell arrived in Labrador His miss on in this bleak nor thern land was to aid the poor fisherfolk hving there He corned on this task of mercy for more than 40 years When he died Grenfell of Lahrador as he was called left healthy growing communities where

disease privation and ig norance had re gned Grenfell was born Feb

28 1865 at Parkgate near Chester the second son of a well to-do schoolmaster He attended Oxford University and then entered London Howard to study medic no There he saw many seamen who lacked medical ad and religious comfort during the r voyages in the North Sea Tohelpsuchmen Gren

fell fitted up an old saving



vessel as a mission ship He roamed with the deep-sea

fishing fleet for five years. His work won such fame that he was selected to lead an expedition to Labradon to investigate the opportunities for service there He found the people-Indians Eskimos and descendants of early settlers from Great Brita n-hving m ignorance and poverty Across a thousand miles of

dreary coast line he established hospitals nursing sta tions schools agri ultural and trade cooperatives and churches Every summer his hosp tal slup cruised along the coast stopping wherever a signal flag in dicated distress. In the winter a dog sled was his ambulance His only long absence from his people oc

curred during the first World War when he served in France as a major in the Harvard Medical Unit

His cause set forth in lectures and books won widespread support The International Grenfell Assocustion founded in 1912 raised money and won re-

eru ts mostly Americans to carry on the work Dr Grenfell had an able as stant and devoted companion in his American wife. Anne MacLanahan Her beauty and wit had so impressed young Grenfell that he proposed to her during an ocean voyage before

he knew her name

ecaffold eight months later

Grenfell was knighted in 1927 by King George V The best book on Dr Grenfell s I fe and work is h s autob ography Forty Years for Labrador (1932) Among he other books are Adult on an Ics Pan (1909) The Adventure of Life (1912) Labrador Days (1919) Deeds of Danug (1934) and The Romance of Lab ador (1934) GREY LADY JANE (1537 1554) Beaut ful intelligent and sweet tempered Lady Jane Grey was the innocent victim of conspiracies by her father and other nobles to put her on England's throne to secure power for themselves The Pr vy Council procla med her queen when Edward VI died in 1503 She was then only 16 After mne days as queen she became a prisoner in the Tower of London and Mary oldest daughter of Henry VIII had the throng. Lady Jane ded on the

Lady Jane was the daughter of Henry Grey Duke of Suffolk and of Frances Brandon meet of Henry VIII When she was nine years old she entered the household of Henry VIII as an ettendent on Queen Catherine Parr Henry ded in January 1547 and a few months later Catherine married Lord Seymour After Cather me a death in September Lord Seymour and Jana a father tried to arranga a marriage between Jane and k ng Edward VI Edward like Jane was then 11 The first a home to make Lady Jane the queen failed and Jane returned to her father a home

Her tutor there was John Aylmer later bushop of London Janes family had always been severe with her but Avimer was gentle and kind. Jane proved an apt pupil At 13 she could read and write Greek By the time she was 15 she also knew Letin Italian and

French and was learning Hebrew

The second plot to put Jane on the throne devel oned early in 1503 This time the guiding spirit was John Dudley Duke of Northumberland King Ed ward had shown signs of fatal tuberculosis In May Lady Jane was married to Guildford Dudley North umberland's son Then Northumberland induced the young king to name Jane his successor in place of Edward's sister Mary Edward died July 6 On July 9 Northumberland took Jane before the Privy Council and had her proclaimed queen The scheme collapsed when the rest of the country proclaimed Mary the queen

Jane was impresoned and convicted of treason. That winter her father joined an uprising against Queen Mary This led the queen to a gn Jane a death warrant. Jane and her husband were beheaded Feb 12 1554 On the scaffold Jane declared that she had not wanted the crown and died a true Christian weman

GRIEG  $(\bar{g}r\bar{e}\bar{g})$ , EDVARD HAGERUP (1843-1907). The rhythms and melodies of Norwegian folk music stirred the poetic imagination of Edvard Grieg. He wove them into songs and instrumental music that won him fame as Norway's greatest composer.

Grieg was born at Bergen. Norway. June 15. 1843. His great-grandfather, a Scottish merchant, had emigrated to



EDVARD GRIEG

Norway in 1746 and had married a Norwegian girl Grieg's grandfather and his father, Alexander Grieg, both served as British consul at Bergen. Gricg's mother was Gesine Hagerup, daughter of the mayor of Bergen. She played the piano brilliantly, appearing as soloist at many concerts.

Edvard's mother began to give him piano lessons when he was 6 years old. He learned well and started composing when he was about 12. The summer he was 15 the famous violinist Ole Bull visited the Grieg home. He insisted that Edvard play his compositions and then persuaded the boy's parents to send him to the Leipzig Conservatory to study music. Young Grieg worked so hard there, and for such long hours, that his health broke down. Pleurisy destroyed his left lung. Nevertheless he graduated with honors in 1862. For the next three years he lived chiefly in Copenhagen. There he became the close friend of Richard Nordraak, a young composer who was eager to establish a true Norwegian musie. Nordraak died in 1856, at 23, but his ideas had a lasting effect on Grieg.

Inspiration for many of Grieg's best songs was his cousin, Nina Hagerup, whom he married in 1867. She was a concert singer and helped to make his music known throughout Europe. They had one child, 2 girl, who died when she was 13 months old

Gricg became conductor of the Philharmonic Society at Christiania (now Oslo) in 1867. In 1874 the Norwegian government granted him a small annual pension. This enabled him to give up conducting and devote himself to composition. In 1877 the Griegs builts studio home in the open rugged country at Losthus on Hardangerfjord. The home where they lived longest —from 1885 until Grieg's death—was the villa Tro'dhaugen in the hills about six miles from Bergen.

Frail health had handicapped Grieg since his early attack of pleurisy. He died Sept. 4, 1907, of heart disease. More than 40,000 sorrowing people crowded the streets of Bergen on the day of his funeral.

Grieg's piano concerto in A Minor, his 'Peer Gyn!' suites, and the song 'Ieh liebe Dich' are among his best-known works. He wrote the music for 'Peer Gypt,' Henrik Ibsen's poetic drama, at Ibsen's invitation, It includes 'The Death of Anse', 'Anitra's Dance', and 'Solvejg's Song'. Grieg's first violin sonata (in F Major), written in 1865, won a generous letter of praise from Liszt. This letter helped attract the attention of the Norwegian government to Grieg'genius. Among Grieg's other works are more than 125 songs and 66 lyric pieces for piano in 10 books

# The Brothers GRIMM, Collectors of FOLK TALES

RIMM, JAKOB LUDWIG KARLAND WILHELM KARL. G All over the world children have grown up with Grimm's Household Tales. They are among the world's best-known stories and have been translated into many languages. Almost every one knows 'Snow White and the Seven Dwarfs', Rapunzel of the long hair, Rumpelstiltskin with his mysterious name, and Briar Rose who slept for a hundred years.

Not so many people know the lives of the Grimm brothers and how they went about the countryside together listening to these folk tales as they were told by men and women who had heard them from their mothers and fathers. For it was the Grimm brothers who first collected and wrote these stories and so started the first scientific interest in folklore. To the scholars of their time the two brothers were best known for what they contributed to knowledge of the origin and growth of the German language. So they were known as philologists.

Boyhood of the Grimms

Jakob Grimm was born on Jan. 4, 1785, at Hanau in Hesse-Cassel. Wilhelm was born on Feb. 24, 1786; so the brothers were only about a year apart in age. They were two of six children. Their father, a lawyer, died when they were quite young, leaving them to



JAKOB AND WILHELM

the care of their mother. An aunt, their mother's ter, helped them financially. Jakoh and Wilhelm grew up in Germany when that country was a looselyorganized federation of states. Pruss a and Austria were the leading kingdoms. There were many small villages a few large towns poor communications and bad roads The pensants were held down and oppressed hy large landowners

We know only a few facts about the childhood of the brothers A visitor to Germany of the period has written of the primitive villages Everywhere we saw the toy houses of our childhood magnified as it were to gigantic size There SCENES FROM OLD FOLK TALES

were vast forests which might have been peopled with dwarfs and enomes Another visitor tells of the delightful way in which children and parents played together and says that every window how ever small moccupied by flowers also describes the fairs that took place each

Year in every town of any size Housewives waited to buy household goods at these fairs An amusing old

rhyme tells how The German housewife hurr es to the fe r To hear a for the pr ce of some small ware Perhaps a broomst ck or an earthen pot She knows that pennies saved are penniss got

We may suppose that the widow Grimm took her chil dren to some near by fair where there were mounds of toys mostly from Nurem berg We do know that Jakob and Wilhelm went to school together in Cassel shared a room and were the

greatest of friends When they were older the brothers determined to study law as the r father had done

In 1809 they went to the University of Marburg Here Jakob studed under the famous law professor and scholar Savigny who interested him in the legends of the Middle Ages and in the songs of the minnes ngers the German poet singers of the 19th 13th and 14th centuries Later Jakob worked with Savigny in the libraries of Paris Meanwhile Wilhelm had returned to Cassel where his mother was living and Jakob joined them there The two brothers became librarians Cassel lay between the Harz Mountains and Frankfurt It was here that George III of England obta ned Hessian soldiers for service in the Amer can Revolution

Later Jakob and Wilhelm moved to Gottingen in Hanover Jakob was a professor and I brarian and Wil helm an under librarian at the university They rema ned in Guttingen until 1837 when Jakob was exiled from Hanover for 10 ming a group of professors in sign mg a protest against the unconstitutional acts of King Ernest Augustus Again the brothers returned to Cassel

Wilhelm had married Dortchen Wild in 1825 but this did not separate the Grimms Jakoh continued to

live in his brother s household and was as fond of Wilhelm's children as though they had been his own A few years later the two hrothers went to Berlin where they were given profes sorships and were elected members of the Acad emy of Science Both of the hrothers wrote learned books. Jakob wrote many more than Wilhelm and his German grammar is one of the world's greatest works in language atudy Both worked on a d ctionary of the German language and on the collection of folk tales

Collecting the Folk Teles To the people of He se in middle Germany and m other near-by regions the quiet schol

arly Jakob Gramm and the more friendly 10vial Wilhelm must have become very familiar For they spent some 13 years in collecting from the lips of people the atories that went into their folk tales. The first volume of Kinder und Hausmarchen (Nursery and Household Tales) was published in Berhn in

1812 By this time friends and relatives were also collecting stories and the bro hers had the good fortune to find a woman who could tell many of the tales ex cellently She was Frau Viehmannin a peus ant woman who lived

pear Cassel Wilhelm s

wife was also very familiar with the old tales and some were presented as she told them. So a second volume was published in 1815 and a third

volume in 1822 What the Grimm Brothers Tried to Do

While the folk tales were intended for children as their first title suggests they were not originally told exclusively for children The Gramms stated in their preface As their simple poetry delights and their truth can interest anyone and because they remain an inheritance in the house they are also called House Stories



These priesres illustrate det ch ful scenes from all sturies and letted by the Gramma At the top a Doctor Ease It All a bear letted by the Gramma At the top a Doctor Ease It All a bear woodcatter who becomes a tennas data because of his wised road jack. At the bettern a Chever 2 or a letter of the start of the start

= 218

In collecting the stories the brothers were careful to keep them close to the original tales as told by the people. "Our first care was faithfulness to the truth." Frequently the dialect of a certain part of a particular section was kept, so that the stories should not lose their flavor. Sometimes there were several versions of the stories, and these the Grimms combined into one, making careful notes of what they had done.

It must have been difficult to choose between the different versions. Should Rumpelstiltskin ride around the fire in a ladle, or should he hop around it on one foot? Should a wolf or a witch live in the sugar house found by Hansel and Gretel? The notes appeared in an early English edition and are valuable, for in them we learn much about the stories, their origin, and their characters. The Grimms trace the origin of Brian Rose to the story of Brunhilde, and note elements of the stories that appear in many countries.

It is easy to see how the stories were kept alive by the German peasants of this time, the cowherd, the poor woodcatter, the woodcarver, who had no hope of rising above their station in life. How satisfactory, when one's main diet is coarse, black bread, to hear of a magic table "which satisfied all needs!" The tales are touched throughout with the gold that the peasants seldom, if ever, saw; "golden eggs," "golden feathers," a tree with leaves of gold. There were good and bad characters, strong contrasts between good and evil, but the Grimms state that "although there is a moral in the stories, that was not their object, and if it is there it easily grows out of them like fruit from a perfect blossom without any help from man."

Some of the tales are more perfect in form than others. Many of these were written down word for word as they were told by Frau Viehmannin, or "Gammer Grethel" as she was later called. She was well aware that she was a good storyteller and knew the gift was not granted to everyone . . . "She told her stories thoughtfully, accurately, with wonderful vividness . . . If required, she repeated them more slowly, so that, after some practise, it was perfectly easy to write from her dictation." This gives us a vivid picture of the brothers at work, writing eagerly, savoring the fine quality of the storytelling. The first English edition was illustrated by the wellknown artist George Cruikshank.

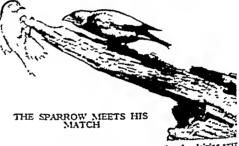
How Hans Christian Andersen Met the Grimms

One of the most interesting sidelights on the Brothers Grimm is given by Hans Christian Andersen in his autobiography. When Andersen was in Berlin he went to visit the Grimms, confident that they would know him as a fellow storyteller. The maid servant asked which brother he wished to see and he replied "The one who has written the most."

"Jakob is the most learned," she said, and took him to the elder brother. Jakob, who lived almost entirely in the world of his books, had not the slightest idea who Andersen was, or what he had written. This so disturbed the Danish writer that he left without meet-

ing the more out-going Wilhelm, who told him later 'I would have known you!" Of his trip to Berlin Ariessen would say sadly, "Grimm did not know me." (h another visit he became friendly with "these two Linly gifted and amiable brothers" and saw them almost daily. "Jakob Grimm," Andersen then wrote, "acca of those characters whom one must love and still oneself to."

After Wilhelm Grimm died in Cassel on Dec. E 1859, Jakob gave tribute to him in a speech to the Berlin Academy, saying that the whole of their live had been passed together. In 1863 Jakob died in Balin, leaving to us the fine heritage of the folk tels. GROSBEAK. "Fine feathers do not make fine birds," but often extremely fine birds have fra feathers. The rose-breasted grosbeak has beautiful black-and-white plumage with a rose-colored brest,



The Sparrow has earned a bad reputation by diving entry many of our song birds, but he soon learns to let the Grasical severely alone. Here a Grosbeak is driving a Sparrow any from a feeding log.

a lovely song, a happy manner, and a clear conservafor he knows that the few green peas and berries in it crop have been paid for many times over (for illustration in colors see Birds). Even though he lack! beauty, song, and manners, his appetite alone reco make him invaluable to the gardener, for with plainly feathered mate and his hungry brood he rid a bug-infested potato patch of the pests in order and supplement the potato-bug diet with sale caterpillars as army-, canker-, and cutworms. De he not deserve a few berries and peas?

Quite as much can be said in favor of other Fit beaks, which is a common name for a group of the finch family with thick powerful beaks (hence the name grosbeak). All have bright-colored feature lovely songs, and appetites for harmful insects. rose-breasted grosbeak is commonly spoken of safe grosbeak, but other species such as the pine and erning grosbeak equally deserve the name. They are The females of all species are quietly colored The feeding and nosting balls from 8¼ to 9 inches long are similar, except in the case of the pine gradual which acts which eats no insects and feeds almost entirely co seeds of such trees as the pine, ash, and since it The nest of twigs and weed-stalks is built it trees. The spotted eggs are from three to fire in number of the spotted eggs are from three to fire in the spotted eggs are from number. The birds migrate south in winter, the the evening and the pine grosbeaks are found within as for ing as far north as Iowa, Illinois, and New England The cardinal is the most show of the group (see Cardinal for illustration in color see B rds). The rose-breasted grosbeak is a bird of the enatern United States and southern Canada. It writers south to Cuba and Central America. The evening grosbeak with its yellow and black coloring. a found in Canada.

It often winters in the northerm United States The black headed grosbeak of the Far West and Mewoo has a neck and breast of tawny gold and black vags marked with white (for illustration in color see Birds). The blue groback is a deep purplish blue the samps marked with chestnut It is found in the southern and we fer a found in the southern and a deep reaches a few southern and the souther

back of rusty brown gray under parts and black and wh te wing. Groubsale belong to the family Fringillidae Scientific name of rose-breated groubeak. Hedyneles budancianus black headed gros beak. Il melanosphal is blue groubsek Giuraca carrilea eve an ug groubsek Heaperaj lono teperima p ne groubsek Pintolau semidator hawfinch Goccolmante.

else occombraustes
GROUNN HOO, From the south
om United States to the Arctic
Cricle live the squirtel a chunky
cous as the ground hogs. They
also go under the name of wool
chick and marmot Venetics of
the rommon ground hog range
throughout the eastern and central
states and northward to Itusion
Bay and the Yukon halbey.

A typical ground hog grows over two feet long and we gis 8 to 12 pounds Clothed with coarse grazly brown hair the animal has a rounded head

heavy body stubby legs and a short bushy tail With its sharp rakehise claws it dies out a burrow in a billisde or field. The burrow is from 10 to 25 feet long with several entrances and has a nestang cham ber at the end. Here the female gives birth to four or five cubis in the late spring.

nice cuts in the late spining on mibbles obver transall number the ground how the mare-sharp from roots vegetables and grain with mare-sharp from the control of the control of the control of the starp in the starp of the control of the control of the starp in the control of the control of the control of the starp in the control of the control of the control of the diager it utters a shall sharple that sends the family scoting into the r burrow (For a pi ture of a family around a burrow see Nature Study) if convered

the ground hog may fight fereely. The bite can cause a ser e would. In the fall the time varying with the season and the part of the country in which it lives the ground hog crawls into its burrow and b bemattes until early spring. The stored up fat keeps it slive (see Hibernation)



its young ground and the entrance to its burrow if tamed when young a ground be may return to its master for food every spring after whatering in its burrow

Legend sayatt comes out avery February 2 (ground hog day) to look for at shaked 11 it zeen it the am mai goes lack to sleep for air weeks but if the day is cloudy and shadowless it stays outs de antice pating an early spring. The idea stems from an old European behef that a sump Candlemas Day (February 2) means air more weeks of winter weather

The scientific name of the common ground hog is Marmota monax Closely related are the longer bodied marmots of the western mountains—the yel low belined marmot Marmota flavientris and the boary marmot Marmota caligata

GROUSE This popular game bird has been hunted so eagerly that in some regions where it was once abundant it has been almost exterminated. It is the habit of these dull-plumaged birds to lie hidden in the grass until the dogs are upon them, then, with a sudden great whirring sound, and with almost the speed of an arrow they sin be.

of an arrow, they rise before the eyes of the startled hunter, who must be both cool and quick if he is to bag his game.

The common colors in the plumage are brown. gray, and red, with touches of purple and dark green in some species. Generally the colors of the male birds are more pronounced. The dress of the female is an excellent example of what naturalists call "protective coloration" (see Protective Coloration). It is so nearly the color of her surroundings that, if she remains motionless on her nest among the grass and leaves, even a keen-eved for or hawk will pass her by. Some members of the grouse family that live in regions where snow is common change their sober summer coats for a winter plumage as

their sober summer coats for a winter plumage as white as the snowy wastes they inhabit, and grow downy feathers on their feet that keep them from

sinking into the snow. Other species grow horny appendages from the sides of the toes to serve as their snowshoes.

The male birds are noisy wooers. During the mating season their peculiar love-calls may be heard ringing through the woods and over the prairie lands. These calls, which take the place of the mating song of singing birds, are dull booming sounds variouslyproduced. Some species have a most extraordinary wing power and by rapidly beating the air cr their breast feathers produce a sound that may be heard a mile or more. Other species are furnished

HOW THE GROUSE ATTRACTS ITS MATE

The male grouse, instead of singing to call his mate, perches upon a log and flutters his wings rapidly, producing a booming or drumming sound which can at times be heard a mile away.

with an air sac of loose skin which acts as a scri of bagpipe, for the bird inflates it to an amazing size; then, with a jerking of the head, he forces the air from it with a hollow "boom, boom," which draws the female birds of their kind. These love "songs" are accompanied by much strutting about and spreading of feather and by many fights among the cocks.

Grouse range in size from the small white tailed ptarmigan 13 inches long to the sage hen 30 inches long. They eat seeds, fruit, and insects. Among all the various species, except the ptarmigan, one cock mates with a whole covey of hens. The nest is on the ground and the hen takes entire care of the 10 to 14 eggs and of the young brood.

Of the North American species the best-known is the ruffed grouse, incorrectly known in the North as

As is a screen

This is a scene in the far North, and the ptarmigans or "snow grouse" have changed their summer coats of grayish brown to their winter clothes of white.

"partridge" the and in the South as the "pheasant." It is found across southern Canada and northern United States to the Pacific coast, and south to Georgia and Kansas. It is about 18 inch long and has tuits of shiny black feathers on each side of its neck which look like s ruff and so give the bird its name A crest of feathers adorns the top of its head. In the early days before this bird had come to know the ways

of man it was so trustful that it would sometimes sit quietly until it was knocked from its perch with a club, and so it was often called a "fool hen" Once having learned the lesson of the dog and the gan, it became wise to an uncanny degree A mother bird will try to entice hunters away from her broad by erying and fluttering along the ground as if wounded The ruffed grouse is the state bild of Pennsylvania

Franklin's groupe, which lives in the deep for forests of the western mountains, is still the "fool hen" It regards man with friendly curiosity and will move slowly out of his way only to avoid being stepned on

On the praines of the Middle West, from Canada to Texas, are found prairie chickens or numeted grouse Once they were numerous but these tast, straight-flying birds are tempting sport for hunters and are delicious food. They were shot down by the millions. At the same time the advancing farms and settlements destroyed their natural foods and coverts Today their numbers and range are greatly reduced With wise protection, however they should escane the fate of the heath hens, which are now extinct

The sage hen is the targest of the family Its home is the barren alkalı desert where it hives almost entirely on sage leaves. The old birds taste too strongly of sage, but the young are good food. They

too face extermination

The ptarmigan or "enow grouse," haes in the Arctic regions of America from Alpska to Labrador, but sometimes migrates in the winter to the northern states. In the autumn at changes its summer coat of gravish brown to a winter cost of pure white

The red grouse, or moorfool, is the famous grouse of the British Isles. It is so well protected by law that it is very plentiful, and sportemen from all over the world go to Scotland every fall for grouse shooting

The grouse belong to the order Gall formes which ncludes the guans qualls pheasants and turkeys The scientific name of the ruffed grouse is Bonara umbellus, of Franklin's grouse, Canachites franklim of the prairie chicken Tympanuchus supido, of the sage ien. Centrocercus urophasianus

GUADELOUPE (gud-de-lop') In the eastern are of

the West Indies he the two islands that make up Ganleloupe With five nearby islets, they form the largest overseas department of France in the Cambbean The total area is 698 square miles The westem of the two relands is mountamons, the other, a low plain The chief products are sugar, coffee, varulla cocoa, bananas, rum, and coconuts

Guadeloupe has tropical beauty but is subject to turncanes Most of the people are Negroes and mulattoes, descendants of French colomsts The capital is Basse-Terre (10,086), but the chief town and port is

Pointe-4-Pitre (4) 3231

Columbus discovered Guadeloupe in 1493 The French settled there in 1635 England and Sweden gained brief possession of the islands. In 1946 France raised it from a colony to a member of the French Union It now elects its general council Population (1946 census), 278,464

Guam (awam) The rugged, tropical island of Guam rises in the Pacific Ocean about two thirds of the way between Hawan and Manila This strategic posttion makes Guam important as an air and naval base and as a stop for transpacine commercial planes

Guam to the couthernmost and the largest of the Manana Islands It was one of the first of the Pacific islands discovered by Europeans Magellan landed on one of the Marianas, probably Guam on March 6 1521 He called them the Ladrones ("thieves") because the natives stole one of his boats

The kidney-chaped island has an area of 225 square mules about that of Chicago It is 30 miles long and 4 to 815 miles wide. Its underlying coral limestone is thinly covered with rich soil Cornl reefs rung the coasts. In the north chills rise abruntly into a plateau up to 600 feet above the sea. The southern half has rolling savannas and on its neet coast are hills. Here is the highest point, Mount Lambon, 1 434 feet The temperature varies but little from the annual average of 81°F Ramfall averages 76 mehes a year Banana, coconut breadfruit, and rubber trees are among the tropical growth of the lowlands Taro, eassava, corn and sweet potatoes are the mam crops Chickens pigs and cattle are raised. Water buffuloes are the chief work animals

Apra Harbor, 31/2 miles wide, is one of the world's great naval bases. On it is Pit: the port of foreum trade Agana the capital, is 5 miles northeast Between them is the naval and commercial air have An Air Force base as 8 miles northeast of Arone

The natives are Chamorros They are of Malas stock, but they have so intermarried with other peoples that there are few pure-blood Chamorros left

Spannards took possession of Guam in 1528 Missstonance arrived in 1668, financed by Maria Anna of Austria for whom the Mananas are named The United States courser Charleston captured Guam in June 1898, and Spain ceded it to the United States on Dec 10, 1898 (see Spanish-American War) In 1899 Snam sold the rest of the Marianas to Germany After the first World War Japan gained them under a mandate

Guam became a United States naval station and was governed by the Navy In 1903 an occup-cable relay station was built at Sumay Under Spanish rule the natives had declined from 50 000 to 10 000. Aided by the Navy's health program, the native population inereased Agracultural and trade schools were built Guam was demilitarized in 1922 by the Washington treaty that housed mayal armament (see Harding)

In 1941 Gusta stood as the only break in Japan's whand barrier that reached 3 000 miles to the equator When the Japanese attacked, Guara fell After a bitter campaign, American forces won it back in 1944 The Navy made Guam into a major naval-air base In 1959 Congress gave Guam local self-government and the patries became American citizens The Department of the Interior was made responsible for relations between Guam and the United States (See also Pacific Ocean ) Population (1950 census), 59.498

# HOME of the OLDEST AMERICAN CIVILIZATION

'UATEMA'LA. The most populous country of Central America is also the most Indian. In fact, it is the most Indian of all the American nations. About two-thirds of Guatemala's inhabitants are pure-blooded Indians of the ancient Mayan stock. They are a country within a country. Living very much as their ancestors did before the Spanish conquest, they have successfully resisted for 400 years the white man's civilization. They labor on his coffee fincas, they build his ever-widening network of highways. but they do not speak his language or adopt his customs. Their beautiful tribal costumes are the symbol of their aloofness.

Most of the remaining third of the population

arc ladinos, of mixed Indian and white blood. A small percentage is Spanish, German, and Negro.

Guatemala is the most northerly of the Central American republics. It stretches from the Atlantic to the Pacific, between Mexico on the north and northwest, and El Salvador and Honduras on the east. It is the third largest and potentially the richest of the Central American republics. It ranks first in foreign trade. Like its neighbors, it is a land of hot steaming coastal plains, volcano-tipped mountains, and high plateaus. (See Central America.)

Land of Eternal Spring

Most of the people live in the highlands (los allos) at heights of 3,000 to 8,000 feet. This is a land of eternal spring, with a mild sunny climate. The days are warm and nights cool. In the rainy season, May to November, there may be 40 or 50 inches of rain.

FACTS ABOUT GUATEMALA

Extent.—North to south, about 280 miles; east to west, about
280 miles, Area, 42,042 square miles. Population (1950 census), 2,788,122; at least 60 per cent pure Indian.

Physical Features.—Cordillera along Pacific coast; about 30
volcanoes (Tacanā, Acateanago, Tagumulco more than 13,000
feet). High valleys and plateans, with parallel ranges strikning eastward from highlands. Pacific and Carishean coastal
plains; plain of the Peten at hase of Ynacatian peninsula.

Exports.—Coffee and bananas (90 of 9 per cent of total valne);
chiel; gold; vezetahle oils; hides.
Other Products.—Corn, beans, wheat, sugar cane, rice, cotton,
livestock; mahogany, logwood, cedar, kapok; testiles,
pottery, shoes, soep, flour, sngar.

Imports.—Cotto afairus, foodstuffs, iron and steel manufactures, tools and machinery, railway and road materials.
Chief Cties (100 census, preliminary).—Guatemala Ctiy (capital, 284,233); Quezaltenango (77,782); Puerto Barrios
(15,659); Mazatenango, Antigua, Zacapa, Cohân (over 6,000).



The church and the village market are the centers about which Indian life revolves. Here it people of the countryside sell their foodstuffs and homemade goods and buy the product of other localities. The picture shows the market of Sololá, which is typical of all. The lold-cloths on the women's heads are their earrying cloths. Meu's clothing is almost as coloridate the women's. The church in the background was built by the Franciscaus in 1541.

The scenery is exquisitely beautiful. The snow; cones of volcanoes—some still active—look down or countryside blazing with the bright colors of flower and Indian costumes. Trails and roads twist skywer along breath-taking barrancas, or gorges, pluncing hundreds of feet below. Here is one of the worlds most beautiful lakes, Atitlán.

Here too is one of the world's most romantic cities visited by every tourist. Antigua, once the richest and proudest city between Mexico and Peru, was the capital of the Spanish colony until it was destroyed by earthquake in 1773. Though the capital was removed to Guatemala City, many of the people remained in the ruined and partially rebuilt city. The Indian spread their wares on market days within the shattered walls and patios of the Jesuit church, monaster, and college. A native pottery works occupies the clore of I ters of Las Capuchinas, the first Catholic sisterhood in Coffee fincas (plantations) have Central America. grown up about others of the city's 80 churches and monasteries. Some lovely Moorish residences, the Palace of the Captains General, other public buildings and the nave of the Cathedral have been restored

Twenty-five miles from Antigua is the new capital. Guatemala City. A great modern city, it is the largest in Central America. It has been leveled by man earthquakes and repeatedly rebuilt, so that few clibuildings remain.

There are no other large cities. About 125 miles west of Guatemala City, high in the mountains (7,60)

feet) is Quezaltenango with 27 782 people. This city was named for the national bard the quetaxil (see Quetaxil). The third largest city is Puerto Barnos a scaport on the Gulf of Honduras. Next in size is Mazatenango in the southheast.

IN SANTIAGO ATITLÁN



very different from these molemutuses are the Indian villages. Mother with the Court of the In hars his not in the village lint in the hills and village at lint in the hills and the court of the chief trading center he will 30% res dents. Chul evistenange the village most visted by foursets is it till most than a tirge plaza and a few narrow streets (population 10°2). Yeth it she centered a municipality of 49 000 people.

The Indians and How They Live
Every Indian village is a lttle
world to itself Its people weave
the rown beautiful costumes which

differ in every village. They speak their own dialect. They rarely marry out of the village. In many villages the land is held in common in others each family owns enough land to raise its own corn and veretables.

In the great plaze before the church is held the weekly or semweekly market Each village speculizes m some product which its traders sell in the markets of its neighbors. On market day bundreds of traders

pour m All are on foot for they are too poor to own pack anumals. The wife trots along after her hugband a baby slung m a cloth arross her back a basket bat ance I on her head. In the basket may be calla liles a bve turkey a pot of honey a pound of black beans whatever she may have to trade.

In a large market one lane may be devoted to leath or goods arother to machine-made cotton goods. Here are hand woven blankets there are wild eaged songbirds and water jars. Open charcoal fires burn along the food lanes where the women are making tort liss (flat cakes of corn bread) and weighing grain vegetables and fruits on a wile scales.

When coffee-picking season comes the villages and their farms are deserted. The government compeltible Jadians to work for sages at least a hundred days a year. This provides above to pick the vitally imporlant coffee crop. At the same time it protects the Indian from the evils of possage. He may no! grbe held in setundakery to work out his del to to the fines owner. (For more details about Indian if the see Central America).

The Agriculture of the Highlands

Coffee is grown almost everywhere in the highlands By far the most important money crop it represents 60 to 65 per cent of the total value of exports. Germans own a large share of the coffee lands and until the second World War they controlled the export trade



le s typ cs highland lad an home Hc aw the wome is wear ng on a hand keen bood evs the heby a head y o ects him from the Ev i Eye

Loro is the staple of the native diet. Every villes the some field in all many rituals are associated with planting and harvesting. It is perhaps no connect matching the predominant in goloris of the native continues red yellow white and black are the colors of corn. Mayan legend declares that the first four men created were made of corn posts and the Mayan first dull at declared in the composition of the dull at declared in the continues of the great Foundation.

Various other crops are grown on the rich volcame soil. Above the eoffee zone are wheat, barley, and potatoes. Below the coffee zone are black beans and other vegetables, cacao, sugar, rice, fruits, and cotton. Except bananas and sugar, these are all grown by

A WOMAN OF ANTIGUA



This woman is selling strings of sweetmeats in the plaza of Antigua Like most Indians she is barefooted.

primitive methods for home consumption On the lower slopes on the Pacific side are scattered cattle ranches.

The Lowlands

Not all of Guatemala is included in the highlands. On the Pacific side, along the 200 miles of coast, is a plain about 50 miles wide. There is another small area of lowland along the 70 miles of Caribbean coast

In the stifling jungles of the Caribbean coast, exposed to the moist northeast trade winds, the natives say it "rains thirteen months of the year." Some places receive 200 inches of rain annually and the average is about 90. The temperature averages between 75° and 80° F. the year around.

The narrow Pacific coast, protected from the trade winds by the mountainous backbone, has a wet and a dry season. It is covered with grasslands, marshes,

scrubby bushes, and

deciduous forests.

Thousands of square miles of jungle and scrub have

been cleared on both coasts for banana plantations. Bananas account for 30 per cent of the annual exports, and Guatemala is second only to Honduras among the banana countries of Central America. The United Fruit Company controls the export trade and grows about 60 per cent of the export crop on its own lands. The plantations are worked by Negro labor. Indians cannot endure the hot, malarial coasts.

Besides the highlands and the coastal low-lands, there is a third great division, which makes up about a third of the area. This is the great empty Petén plain, which thrusts far northward hie a wedge between Mexico and British Honduras. It is partly grassy lowland, partly jungle. In all its 14,000 square miles there is not a road or a navigable river. From the Petén and the neighboring regions in Mexico and British Honduras comes virtually all the world's supply of chicle, from

which chewing gum is made (see Chewing Gum). The chicle is flown out by airplane. Other Resources and Industries

Forests cover more than 2.000 square miles. addition to chicle they contain valuable cabinet woods, drewoods. and medicinal These plants. resources are little developed away from the coasts because of the lack of transportation. The cerba tree is the source of Lapok or "tree cotton." One United States company has planted several hundred thousand of these trees. Cinchona or qui-

TRAVELING MERCHANT

Traders trudge from market to market carrying burdens of 80 or 100 pounds. This merchant is carrying a huge lot of water jugs tied to a wooden carrying frame which is supported around the man's forehead with a tumpling

nine trees have been planted with the assistance of the United States Department of Agriculture

Although Guatemala has a great variety of minerals, the difficulty of transportation has discouraged their exploitation. Gold is found in some of the

short, swift rivers, and is exported in small quantities Some chromite is exported; lead, salt, and sulphur are produced for home use.

There is little manufacturing. The Indians make nearly everything they use except knives (machetes), and the rest of the population has little buying power. The few textile mills import most of their raw materials. Other products are flour, sugar, soap, pottery, shoes and other leather goods, bricks and tile, and furniture. The United States

usually supplies about



This popular annual dance celebrates the Spanish conquest The masks represent Alvarado, whose red-gold hair won him the name Tonatinh, "Child of the Sun."

half of the imports and takes two-thirds of the exports Many roads have been built

Many roads have been built meent years, and most of the cities of importance can be reached by automobile. Guatemals was the first country to complete its share of the Pan American Highway. Air service is well developed. Guatemals City is connected with both oceans by rail.

Education and the Arts

All children between 7 and 14 are supposed to attend school but the government has so far been unable to provide enough schools and teachers. Only





about one in five of the people can read and write in recent years there have been special efforts to set by rural schools and improve materiation. But even in the tities many children of school see get no schooling. Scendary schools exist only in the largecities. Guatemala City has a number of vocational chools and the Autonal Cluversity, which includes several professy and schools. The National School of Law is in Qientifenanio. In the Indian village of San Pedro Sucatepoques is the Industrial School of Simming and Weaving maintained by the govern

ment to keep alive the beautiful native feetile aris. In literature Guatemala has produced several writers of distinction (see Latin American Literature) lis greatest pointer is Carlos Merida. Other arists are the painters Humberto Garavato and Alfredo Galves Suares the sculptor Yels Gunther and the Puppoteer Tony Sarg

#### History and Government

Gustemala was the cradle of the Mayan c visat on The civilizat on reached its height in the Peten plan and the

ne ghboring Yucstin pen nsula (See gleo Mayas Yucatan) The highland Mayan tribes were con quered and virtually enslaved by Pedro de Alvarado between 15°2 and 1524 Under Spanish rule Antiqua was the seat of government for all Central America When Gustemals won to freedom in 1821 it was for a time the leading state in the Federal Republic of Central America & nes 1838 when the republ o broka up nto independent states. Guatemala has been gov. erned by a few long term diritators Rafael Carrera 1939-65 Justo Rufino Barr os 1871 85 Manual Estrada Cabrero 1898-19°0 and Jorge Ubico 1931-44. A though Ub co protected the Ind ans and put through the most progressive reform program n the country a h story the people revolted against h a ron handed rule and forced him to renga in July 1944 Meanwhile the republ c had declared war aga not the Axis n December 1941 and had given the Un ted States air and naval bases. The constitution of 1945 provides for a president and a National Assembly of one chamber elected by universal suffrage Council of State has three members elected by the Nat onal Assembly and four appointed by the presi deat Roman Catholicom is the prevailing religion but all creeds are tolerated (Sea also Latin America.)

GUAVILE (gua-9e là or us yo la) When war cut off the snephy of rubber from Malays and the East Indoes early in 1912 the United States turned for part of its new siphy to a dusți looking Blaction shrub the guayule. Its roots and stems give the ame lates which is obsisted from rubber week from the factors without its obsisted from rubber week from the factors without the part of the part o

Experiments had been made with grayule in Mes-Experiments and Colfform amou 1907 but the rubber had need from 15 to 20 cents a pound and plaintation to the produced in the Orneit for much Ex-Tiba hampered development until the United States Starled intensive work under a bull signed March 5 1912 with an initial project to maintain 75 000 acres of plants in the Vivstera Hemresphere. In the first years of the war, about 32 000 acres of guayule were bulled in the United States, mainly in California.

Production of rubber from guayule starts with uprooting the plants by machine. The plants are ground between rollers. The resulting meal is powdered, and the latex is floated off in settling tanks. Then

it is treated to remove resin. The resin amounts to about one-fifth of its weight, or five times as much as in latex from rubber trees. The latex is dried under vacuum into rubber, and pressed into slabs.

By the time the first war crop of guavule was ripe, the United States was producing synthetic rubber. After taking about 3 million pounds of rubber from guayule in a difficult process, the government plowed under a huge acreage in 1946. But after the Communists increased in strength in Malaya, the United States in 1951 re-

sowed guayule, in Texas, to be processed by a new method. Guayule grows to about one yard high and a yard wide when fully mature. It may live for 50 years, storing rubber during dry seasons for ten years. The flowers are small white or yellow

GUELFS (gwelfs) AND GHIBELLINES (gib'e-lins). The rivalries of these two great political parties long distracted Germany and Italy. "Welf" (which is "Guelf" in Italian) was the name of a ducal family which ruled Bavaria and Savony in the Middle Ages. Its most noted member was Henry the Lion (1129-1195), who was deprived of his lands by the Hohenstaufen emperor Frederick I (Barbarossa). The rival battle cries of these two families-"Hi, Welf!" and

Swabia near Castle Hohenstaufen)-became in Italy "Guelf" and "Ghibelline," respectively. The Hohenstaufens stood for a strong monarchical government and for the imperial rule over Italy. The Guelfs stood for feudal opposition to the monarchy and for the independence of the Italian towns. The influence of the papacy was usually on the side of the Guelfs. After the fall of the Hohenstaufen emperors (1254), the larger issues between the two parties were lost sight of in petty feuds. By the 15th

"Hi, Waiblingen!" (the latter from a little village in

century the names Guelf and Ghibelline lingered only in Italy, where they came to mean little more than local factions marked by trivial practises such as wearing feathers in the cap, or making certain gestures in speaking. The house of Welf (Guelf) continued to rule certain parts of Germany-Hanover and Brunswick-until late in the 19th century. With George I, in 1714, the Guelf (or Guelph) family came to the throne of

Great Britain as the Hanoverian line.

America which lies between the Orinoco River, the Amazon River and its tributary the Rio Negro, and the Atlantic Ocean, is known to geographers as

GUIANA (gī-ā'na). That little known part of South

Guiana. In common usage, however, Guiana means especially the three zones of British Guiana, Dutch Guiana, and French Guiana. The coast is everywhere low, hardly rising above high watermark. For 20 A SUCTION MACHINE GATHERS GUAYULE SEED



miles inland the land was once a mangrove swamp, but it was diked and drained by the early settlers and

thus made into fertile plantations. Along the shores and on the banks of the numerous rivers, where similar plantations have been formed, live the scanty population. Beyond the stretches of

rich heavy loam brought down by the rivers, lie low ridges of sand and shells, showing where the coast line was in former ages. Farther inland the country rises into a rocky hilly plateau (3,000 to 4,000) feet above sea level), covered with primeval and almost impenetrable forests, except where grassy plains on sarannas occur. The ranges of low mountains and hills which traverse this plateau are rich in gold, aluminum ore, and other minerals. In the perpetual summer of the hot moist climate

height and variety of its trees, many of which furnish valuable woods, and for the size of the leaves and flowers. Orchids sometimes grow in large masses with flower stems 12 feet high, and gigantic vines festoon the trees. In the lagoons and rivers grow many kinds of water lilies. The largest, the famous Victoria regio with leaves six or seven feet across, has been carried from British Guiana to many other parts of the world. Alligators and great fish of innumerable species abound in the rivers, and the forests are filled with richly plumaged birds, such as the scarlet ibis, white egret, and flamingo; with reptiles of many kinds; and with wild animals, such as the tapir, the sloth, and the ant-eater,

vegetation flourishes. The district is noted for the

jaguar and monkey. The in ects are remarkable for their great var ety and brilliance fe loring

The Guiana coist was fir t siel te i on the third voyage of Columbus in 1498. Du ing the fettl een tury Spaniards and Portuguese ent ed up its rivers in search of the fabled El Dorade Su Walter Rale gh led an expedition

the colony a most press ng problems Increasing postwar unemployment contributed to a large extent to the rise to power of the pro-Communist Peoples Progressive party led by Dr Cheddi Jagan. In October 1903 the governor was forced to depose Jagan s gov ernment and suspend the new constitution Troops

were sent from the United Kingdom

to maintain order Suringm (Dutch Guiana) was ceded by the British to the Dutch in 1667 in return for the surrender of the Dutch clam on New Amsterdam now New York About 54 300 square miles in area Sumnam has 214 000 ml ab t ants (1919 est) About one third livein Paramanho the capital Most ars mine and plan tation workers chiefly Hindus Javanese Chinese and Negroes In the interior are 22 000 bush Nedescend groes ants of escaped

slaves There are

ATLANTIC TALES MIGH SO NT WATERFALLS -

Guiana is divided among the British the Dutch and the French From the high forested plateau many rivers plunge to the narrow costal pla a Excep around contail cases the land is covered with dense forests

ments British Guiana, the only British possession on the mainland of South America has an area of nearly 90 000 square miles and a nonu lation of 275 701 (1946 census) More than two thirds of the prople are African Negroes and Asian Indians imported

to the Orinoco

River in 1595 and

agam in 1617 (we

Raleigh) By the

middle of the 17th

century British

Dutch and French

traders had found

ed several settle-

ss mine and plan tation workers South American Indians number

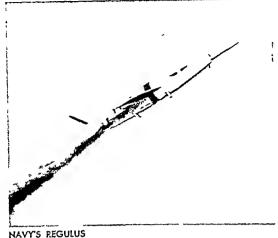
about 18 000 There are smaller groups of European whites and Chinese Principal exports go to the United States Canada and the United Kingdom They include be unite gold diamonds timber helata (a gum) augar molasses rice rum and copra

Transportation is largely by river and air for the rugged interior discourages the building of railways and roads and heavy runs make them hard to main ta n There are about 450 males of navigable rivers but hardly 100 miles of railways Passengers and mail are flown between Georgetown the capital and Viami Fla Georgetown is below h gh tide mark and is drained by canals and pumps. Its houses are built on piles. In the interior rivers plunge from the plateau and form vast falls such as Kareteur Falls on the Potaro River (for picture see South America) Also notable are Marina Fall on the Ipobe and the falls of Mount Roraima which drop I 500 feet

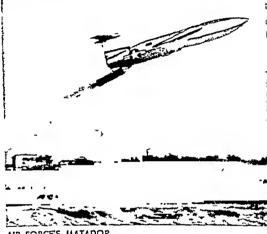
In the destroyers for-bases transact on between the Un te l States and Great Britain in 1940 air and naval bases were acquired near Georgetown (see World War Second) Leased for 99 years they could be used aga n in an emergency

Population expansion has far outdestanced industrial growth Unemployment and political strile are about 2 000 whites To protect the bauxite deposits which supply the United States with a major part of its aluminum ore imports United States troops occu nied the colony in 1941 Other exports are sugar rum coffee and gold

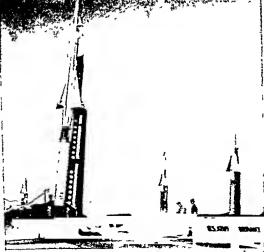
Guiana (French Guiana) with its 34 750 square miles has 26 851 inhabitants (1946 census). It became noted for its penal colony established in 1852 France sent unruly French convicts to prisons on three tiny islands One Devil a Island became famous as the or son of Capt Alfred Dreyfus the victim of a French army plot in 1891-99 After release many convicts nere stranded in Guiana With their descendants they formed much of the white population Abolition of the penal colonies was started in 1946 and completed m 1953 The free settlers include Negroes and Indo-Chinese Most of them are mine plantat on or road laborers About 3 000 South American Indians I ve m the jungles Cayenne on the island of Cayenne is the cap tal and seaport The few exports include gold sugar coffee racao and timber Only a few thousand acres are under cult vation To further develop the resources of the interior France in 1930 set it up as a separate colony But m 1946 all French Guiana became an Overseas Department in the French Union (see France)



NAVY'S REGULUS



AIR FORCES MATADOR



ARMY'S NIKE

# Modern SPEARHEADS for WAR and SCIENCE

UIDED MISSILES. World War II brought, along with radar and atomic energy, an almost entirely new family of weapons collectively called guided riv cales. It is jokingly said that these missiles have upset not only the art of warfare but even the time-honored sequence of orders. For guns the orders are: "Ready! Aim! Fire!"-for missiles: "Ready! Fire! Aim!" This is not quite true, however, for even guided missiles are aimed before firing; but one of their distinguishing characteristics is that the firing crew can continue to aim after firing. The other outstanding charge teristic is that a missile is not fired from a gun but is "fired" only in the sense of being ignited, after which it goes on its own way under its own propulsion system. Only a weapon which has both these characteristics is a guided missile. Bombardment rockets for example, although they proceed under their own power, are not guided missiles because their path (trajectory) cannot be controlled after firing.

Early History

Experimentation with naval torpedoes began about a century ago and many types were created in the latter part of the 19th century (see Torpedoes and Mines). Some of these were electrically propelled, both by means of built-in batteries and through trailing wires. Others ran on compressed air supplied through trailing hoses. One type held two reels of piano wire geared to two propellers. A shore-board steam engine pulled the wires, and the harder the engine pulled the faster the torpedo moved away from the shore.

Many torpedoes were suspended from floats to aid the launching crew in guiding the torpedo to its target. All these torpedoes were meant for harbodefense from shore installations: however, none ever saw service. Only the Whitehead torpedo survived and it was self-powered but unguided. Efforts to produce a guided torpedo were fruitless.

American Developments

The first attempts to create an airborne counterpart of the naval torpedo took place in the United States during World War I. A pilotless plane was to be guided to a target and crashed into it in a power

dive exploding its charge. In 1916-17 a prototype called the He att-Sperry Autoratic Amplane made a number of short test fight, proving that the idea was sound. In November 1917 Army representatives witnessed one of these flights and started a am lar aerial torpedo or flying bomb project led by Leut Col Bion J Arnold for the Air Service and Charles Kettering for industry The latter was assisted by Orville Wright and C H Wills of the Ford Motor Company Various companies working together produced 20 complete p lotless arreraft (called Bugs) and a sucres ful test flight was made Oct 4 1918 Since World War I ended five weeks later all projects were discontinued except for some experiments with Bugs The project was dropped in 1925 for lack of funds

The Navy 8 Bureau of Ordina ce dec ded to follow upon expect of the overall problem of the serial to pelo and to develop a rodu controlled plane An N a trainer explane was used as the lasse whole as of tebul it with stab inxton and ratho control equipment of the Naval Research Labo acroy and by Carl Norden Asserted Labo acroy and by Carl Norden as served to the plane as damated in Laboling and and I Tus ended the serve of the first of the drones as pitotless planes not used for combat as now called

To combat are now design there was little ms learning the method of the combat and the combat and the combat and program as a tation produced setults which were later applied on unsules. In 1936 the Navy began another drose program which was intended to provide realistic state for antiarrent gunner practice but which die re ity influenced m as le development. Leutenant Commander (dater Rear Adm.) D. S. Fahrery was in charge of the project. The place used was a Stearnia again discolored by the relation of the state of the project. The place used was a Stearnia again discolored by the relation combat and the combat

greated the development of assumit drosses in January 1941 work begain on the conversion of a TG 2 (torpedo plane) and a BG-1 (dree bomber) into massles. The converted and pulcies torpedo plane from by a pilot in a plane ten me of the constituent of the converted of the convert

plates were converted and used in Worth Was II. Since a plane can carry a larger load in a glober than it can carry directly the next plan was to build a glober born to be towed into the convict area and guided into the target just as the assault drones were guided. Several such divelopments were started among them ag li de born with a ridar hom an device Called the Bat it as aw act on in the Passific Other

PARTS OF A GUIDED MISSILE GYROSCOPIC PAY LOAD SYABILITE P {WARHEAD AND RADIO OR SCIENTIFIC INSTRUMENTS CONTROLS~ OUTER SKIN. FUEL TANKS FUEL PUMPS > - FIRING CHAMBER INTERNAL CONTROL SURFACES: EXTERNAL CONTROL SURFACES RIAST.

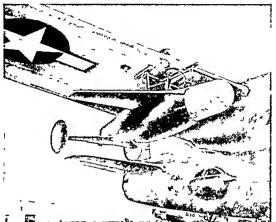
This d agreem suggests the shape and arrangement of parts to a type of guided m as a Details of the gu dants systems of most modern miss les are closely guarded mil tary secrets

musiles were the BC I an I BG-4 glide bombs the latter television equipped which were used in Europe Four other in sules were doveloped in the United States Little Joe an antainerit missle propelled by solid fuel rockets and three types of Gorgon with pulse jet engine turbojet engine and I quid fuel rocket motor respectively.

German Developments

In 1932 the German array having devoted a small amount of money and time to present on notice weapons became interested at time to the present of the few years later the the time to the few years later the few years later to the few years few of Person of the few years few of Person of the few years of the years of the few years of the few years of the few years of the ye

A BAT NESTLES UNDER A PRIVATEER'S WING



One of the Navy's giant patrol planes shelters the missile called the Bat. Privateers carry a Bat under each wing. They were used to attack Japanese shipping during World War II.

were used to retaliate for the Allied air raids on Germany. During development, however, they had different names. The V-1 was first called Ficseler 103, or Fi-103. It also had the code name Kirschkern (cherry pit). The soldiers who launched it called it Krāhe (crow). The V-2, during development and even later, was designated A-4 (A for "aggregate," a term used for devices consisting of a number of subassemblies).

The fact that a formerly lonely Baltic island was teeming with activity was not overlooked by British Intelligence. The Royal Air Force flew over almost on schedule to take photographs. One day an R.A.F. pilot returned with a photograph of Peenemunde which showed something like a small plane on a launching ramp. It was an early V-1. Danish fishermen confirmed the suspicion that Peenemunde was an important military target. On the night of Aug. 17, 1943. the R.A.F. sent 300 bombers to destroy the research center. The raid destroyed some of the workshops and devastated the housing area. Work was halted for weeks. The main test stand was not hit. It was later bombed by American planes. But the great raid was too late. Both the flying bomb V-1 and the long range rocket V-2 were being produced.

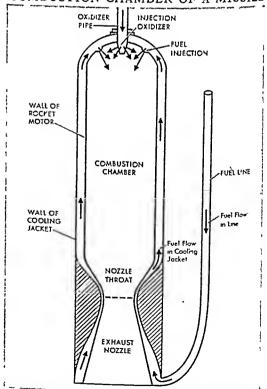
The V-I looked like an airplane. It had a fusclage 25.4 fect long and a wing span of 17.7 feet. Its warhead held 2,200 pounds of high explosive. Behind the warhead the fuselage held two wire-bound spherical pressure tanks containing compressed air to operate the vanes. Then came the fuel tank, which held enough 80-octane gasoline for 20 minutes of flight. The aftersection of the fuselage housed an automatic pilot which held the V-I on course and at the set altitude, usually 2,000 feet. The propulsion unit was mounted on top of the fuselage. It was a jet engine of a type now called a pulse jet and was simple and cheap to produce; but it did not, like the turbojet, produce a steady exhaust hlast. Its exhaust was intermittent, causing vibrations of the whole structure. It did

not work well when at rest, for in order to operate properly it had to move at a fairly high speed. Therefore the V-1 was launched from a ramp by means of a catapult. Its usual range was 150 miles (longest observed range, 175 miles) and the flying speed about 350 miles per hour—slightly faster than the fighter aircraft then in use.

The first V-1 crossed the English Channel in June 1944. It carried a mechanism to shut off the fuel flow at a certain moment and put it into a dive that would crash it into the ground. Occasionally this mechanism failed to function, and the V-1, with motor silent, would go into a glide and land without evploding the warhead. Thus the Allies learned how the V-1 worked.

All V-1's were aimed at London, except one incompleted group intended for Bristol. The total number fired at London was 8,070—1,847 were shot down by planes, 1,878 by antiaircraft guns and rockets, 232 were stopped by barrage balloons, and more than 1,000 missed the city. London was hit by 2,420 V-1's, killing 5,684 persons, wounding 17,197 badly and 23,174 slightly; 24,491 dwellings were destroyed and 52,293 made unmhabitable. Even after the launching sites were captured an occasional V-1 hit London, carried within striking range by a German plane.

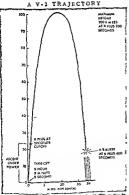
# COMBUSTION CHAMBER OF A MISSILE



Here we see how fuel flows into a missile's combustion chamber. It is forced through a cooling jacket before entering the chamber to compensate for the terrific heat that is generated.

The V2 saw action later than the V-1 and held a longer range—about 190 mile: It ded not need a launching ramp but was fixed from a table cashy care of on a truck. The noticet was almost 47 feet tell and had a take-off weight of slightly over 12 tons. The varience fixed with the high evidence annutal weighed one ton the nocket structure trieff weighed there tons, and the title onessing of gram almost discussion of the contraction of the contractio

The V-2 s nose was the warhead. The compartment housing the controlling instruments came next The alcohol tank followed an I then the glass wool m sulated ovegen tank with the alcohol pine leading downward through its center Below the oxygen tank was what the British call the power bay ' housing the propulsion equipment. It held the rocket motor and equipment for forcing the two liquids into it. This was done by two centrifugal pumps direct by a steam turbine receiving its heat from a ste an generator essentially a pressure container into which putacuum permanganate and high strength hydrogen perovide (85 per cent hydrogen peroxide and to per cent water) were sprayed Reacting to the permanganate the perovide (H2O2) decomposed into nater and free oxygen, releasing so much heat that not only the water



This diagram shows the trajectory of V 2 No 21 (Whate Sands March 7 1947). The trajectory is part of an ellipse with one focal point toinciding with earth 5 center (if is not a garabola)

formed by the decomposition but also the water present as an "impurity" were turned into steam.

The alcohol was not forced directly into the motor but endered a cooling jacket first for no metal could stand the heat developed in a rocket motor. Actually there is no need for such a metal. Ordinary inid steel works well when cooled, and in a rocket motor the finel does the cooling.

For warfare the V-2 s were grouped in 'hatteries" making a road convoy Each of three special vehicles (Moler-waggons) carried a rocket one truck carried alcohol and another overen. There were also trucks for the firmg crews and staff cars so that one battery consisted of about ten vehicles. On reaching the firmg sate the tables were placed on the ground. These were circular steel rings shout five feet from the ground Each ring rested horizontally on four adjustable legs. A rocket stood vertically on each table A steel pyramid between the legs of the table hollow and filled with water, was used to part the rocket's blast It was called the blast deflector. The rockets were then placed on the tables and fueled. An ordinary fireworks pin wheel was inscribed into the exhaust nozzle as the ignition device

With the order Fire! the pin whisel was electrically granted. Then the fuel valves were one ned so that the fuel could flow from the tanks into the motor This was called the preliminary stage and served to check the proper burning of the motor. The thrust generated during this stage was about seven tons not sufficient to left the 12-ton rocket When the firmg officer saw that the motor burned properly he switched the fuel pump assembly into action Within three seconds the pumps ran at full speed, forcing the fuels into the rocket at the rate of 275 pounds per second The thrust jumped from 7 to 27 tons and the rocket, balancing on its fiery exhaust, rose slowly into the air In the first second, it traveled hardly its own length but accelerated steadily. Pour trim tabs in the stabilizing fine and four graphite rudders in the blast stylf balanced the rocket to keep it on a vertical course for several miles. Then the guiding mech amen operating the graphite rudders slowly tilted the rocket s pose in the direction of the target. After 52 seconds the rocket moved upward at an angle of a Ittle more than 45 degrees, still accelerating For another 13 or 14 seconds it continued on this tilted path under power, then the motor was shut off At that metant the rocket was about 20 miles high, shout 28 rules from its take-off point and moving one mile per second. It then traveled like an artillery projectile on momentum only, to east into the target area 340 seconds after take-off Since it moved shout 21 times as fast as sound, its coming could not be heard, but occasionally people near the impact point saw one

The first V-2 took off from Peenstrunde early in 1932 The first one aimed at London was fired from the Netherlands on Sept 8 1944 The bombardment ended on March 27, 1945 when the I 115th rocket fell in heat The Germans had fired more than 1,400 rockets. Several hundred fell short or did not function properly. The total toll of the V-2 assault was 2,511 killed and 5,869 seriously wounded in London; and 213 killed and 598 seriously wounded elsewhere in England. Both the V-1's and V-2's were later used by the Germans on the European continent.

Germany also developed a number of glide bomb missiles. They were usually called Henschel, or Hs, missiles after their manufacturer and were used mostly against Allied convoys. Usually these missiles had a solid fuel rocket attachment to increase their diving speed. They were all radio controlled.

#### Research Missiles

At the end of World War II American troops captured the underground factory in the Harz Mountains where the V-2's had been manufactured. Three hundred railroad carloads of V-2 parts were shipped to the United States. Some of the German engineers who had developed the V-2 volunteered to come to America and to continue rocket research in the United States.

The next step in the story of the hig rockets was known in the United States as the "V-2 program." The parts shipped from Germany made ahout 25 complete rockets. More than 50 others were almost completed with the exception of parts which could be manufactured. These rockets were fired from the newly established White Sands Proving Ground in New Mexico. The Army Ordnance Department trained American soldiers to handle and fire large missiles. Various scientific institutions supplied instruments to he carried by the rockets into the upper atmosphere. The operation was co-ordinated by a special V-2 panel of the Naval Research Lahoratory.

After some failures the White Sands rockets soon reached heights of more than 100 miles—the record in the V-2 program was 114 miles; although later a lightened V-2 climhed to 128 miles. The scientific instruments were hooked up with an automatic radio transmitter and data was recorded on the ground while the rocket was in flight. Since it was not necessary to recover the instruments, the rocket was left to crash in the desert.

When cameras were carried, however, the film had to he recovered; but the rockets struck the ground with such force that nothing could stand the impact. The solution consisted in putting some four pounds of TNT under the instrument-filled warhead and exploding this charge by radio from the ground when the rocket. on the downward leg of its journey, had reached the 100,000-foot level. After the "air burst," as it was termed, the warhead fell freely to the ground. The rocket, with a gaping hole in front and the heaviest remaining piece of equipment, the motor, in back between the stabilizing fins, immediately became extremely unstable. It could not fall nose down or even tail down; it fluttered tumbling to the ground and often hit the desert flat. It could not he reused, but the impact was comparatively gentle and film in a well-protected camera was safe. On occasion some instruments were released on the way down with their

own parachutes. To equip the whole rocket with a parachute was impossible. Large parachutes are too bulky to carry.

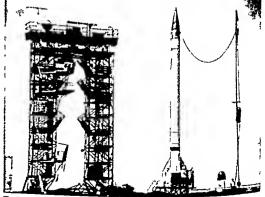
The V-2's, however, were not the only rockets to rise from White Sands. The first rocket to take off was an American model called the Wac Corporal. It was ahout 11 feet tall and reached a height of 35 miles As the supply of V-2's grew smaller other rockets were developed. One of them, the Navy's Viking, is as tall as the V-2 but slimmer and lighter. It has gone as high as 135 miles. The Aerobee is another small rocket about the dimensions of the Wac Corporal. It too is fired with a solid fuel hooster to provide initial speed. The Aerohee can go up 75 miles. Simple and reliable, it is probably the most useful research missle in use today.

An important experiment was made on Feb. 24. 1949, when the first rocket of Project Bumper took to the air. It was a modified V-2 carrying a Wac Corporal instead of a warhead. As the V-2 neared exhaustion of its fucl, 20 miles up and going at the rate of a mile a second, the Wac Corporal, with full fuel tanks, was ignited. It lifted out of the V-2, adding its own half mile per second to the velocity it already had, thus obtaining a maximum velocity of one and a half miles per second. This was enough to make it coast to a peak altitude of 250 miles into the thin layers of the upper atmosphere (see Atmosphere). From the point of view of the engineer this experiment was important because it proved that the separation of rockets in flight could he accomplished.

Types of Missiles

Modern missiles are classified in various wayssome by propulsion system into rocket-propelled missiles, others as ramjet-propelled missiles, and so on Military men prefer classification by purpose in the following categories: SAM (surface-to-air, or anti-aircraft), AAM (air-to-air for combat hetween aircraft), STS (ship-to-shore), SSM (surface-to-surface, such as the V-2), ATS (air-to-ship), ASM (air-to-surface), AUM (air-to-underwater), and others. There

NAVY'S MARTIN VIKING



Technicians check a Viking rocket. This 5½-ton, 40-foot-long missile climbed to 13s miles in 1951. To the left is the gantry, or work platform, used to prepare the Viking for launching



The Loon seen taking off from the deck of the submarine Carbo noro is a jel-propelled pilolless surgraft with inletnal controls

Its course and sititude are set in advance and an automati pulot takes over after the missile is launched

are also the classifications air launched and surface launched missiles. That these classifications are more satisfactor, for military than for other purposes as shown by the fact that both the V 1 and V 2 dif-

ferent as they are are SSM missiles

The fact is the clue to a simple class feation vyatem All miscles can both definition two large groups of which the V i and V 2 are examples. The V I rebed on sings to become approver. As it moved from ramp to target it followed a flight path as a place does Hence we get the major group of the seredy namically supported or flight-path missiles also lated cruings maked. More V 11 and Regular and the A r Force v Matador. All these can take off from a both lambda of the V 11 and Regular and the A r Force v Matador. All these can take off som which have drope off.

Crui ing missiles can be powered by any eogine except a rocket motor. They are comparatively cheap
(the price of one V 2 bought 20 V 1 s) but they can
be shot down. In the last phase of the V 1 attack
on London three out of every four missiles were successfully intercepted. The engines of cruising missiles

are air breathing like those of planes and they can not climb out of range of fighter aircraft

The messles of the second group are characterist will wangless and not supported by air. Thus they follow a trajectory rather than a flight path and are called trajectory muscles. They are note difficult to build than crusing missles. They are also far more expensive but due to their enormous speed and preent ability to move at high altitudes are almost in possible to interrept. Barring mechan cell fashers all trajectory missless fired should reach their target Trajectory missles are rocket powered because the air along their trajectory becomes too time to provide oxygen for an ar-breatting eagene

Gudance systems for messies are multary secrets but a few principles can be explained. A long range cruining mustle can be guided by radio but if it skims too close to the ground (to avoid interception) the guiding engineer would as a rule base to be authorne. One method of guiding a crussing missile is

to equp it with a television camer. The engineer in then see on a screen what he would see if he were in the missle. Thus he can fly it by remote control. This was done by the United States Navy in Lorea. Future cruising missless may be eith mayigating. A missle might fly at night with a robot pilot sevicating by the stars as a bimman pilot would.

Trajectory missiles in little danger of interception require a minimum of guidance from ground or air. They might be made to respond to a radio target marker dropped by a plane. The missile would orient

itself to hit such a target

Maximum guidance is needed for SAM missiles There are three poss ble systems One is to select the target a bomber with a radar beam and then give electronic orders to the missile through another beam which trails it (the two-beam system) Method two (the one beam system) uses a misule called a beam rider which is thrown into the radar beam that trails the target. The mechanism of the built-in gu dance austern is such that a rocket straying from a beam would return into it. This is sometimes called con science out ding for the mechanism like a conscience keeps the misule on the narrow path of the beam Several miss les can be fed into the same beam in quick succession. The third system is called hom The messle is fired in the general direct on of ing

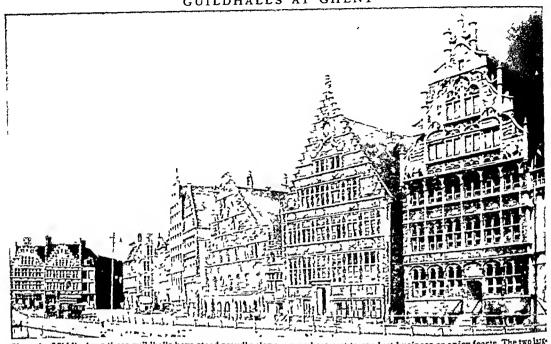
the target. It carnes a device which resoonds to something for instance the heat of the target's engine or its noise. This device will make the miss is follow the source of the heat or noise until it hits the target. A homing missile could be safely used only if no

friendly aircraft were in the sky

Little information has been released about more recent missles except for the Nike (Greek for verory). It forms part of the delense of our cities. The Nike is a true rocket and is helped along early in its trajectory by a solid flue booster rocket.

Missale building is still in its early stages Programs of research and development are being carried on in other nations as well as in the United States For security reasons there is little information avail able about many developments (For biblingraphy see Flynce Travel.)

# GUILDHALLS AT GHENT



Since the Middle Ages these guildhalls have stood proudly along the Lys River in the old city of Ghent, Belgium. Here guild

members met to conduct business or enjoy feasts. The two lus est, at the right, are the Staple House and the Masons' Guildhi

GUILDS. In every important town in Europe during the Middle Ages, men of each trade were members of associations called craft guilds. The guilds regulated their occupations and preserved a monopoly. The weavers were probably the first to organize. Soon after, the goldsmiths, saddlers, fishmongers, bakers, dyers, glovemakers, and many other trades, some with only a few workers, formed separate fraternities. In Paris, London, and other large cities there were as many as 50 or more guilds by the 14th century. Usually they were authorized by the local governments, but sometimes they obtained their charter from the king.

### Guild Rules and Regulations

The guild rules provided that nonmembers could not practice the trade within the town. In some places a worker could become a member as soon as he showed the required degree of skill. In other places membership was hard to obtain. It went only to sons or sons-in-law of members or could be purchased only at a high price.

The guilds required standards of quality in articles made and sold by their members, and penalties were invoked for inferior merchandise. For example, the weavers' guild required a certain number of threads to the inch in standard cloths. Hours of labor were regulated and work at night and on holidays was prohibited. In later times, the insistence on obsolete standards and processes handicapped industrial development. This led to a shifting of manufactures to villages and to new towns where guilds were not established.

Other rules provided for mutual help, care of sick or needy members and members' widows and orphans. Once a year or more often the members gathered for a feast. In summer, usually on Corpus Christi day, they staged one of the miracle plays popular at the time (see Miracle Plays). Since the members of a craft usually lived on the same street, the guild was also a center of social interest for its members.

A young man qualified himself for membership in the guild by passing through an apprenticeship. As a boy he was bound out by his parents to an employer for a number of years, usually seven. The master fed, clothed, and lodged him with his family above or behind the shop. When the seven years were up, he was free to become a journeyman (from the French word journee, meaning a "day's work") and work for daily wages. Often he traveled from town to town seeking more knowledge of his craft. If he saved his mone, he might start a small shop and be accepted for guild membership and privileges.

In addition to the craft guilds, there were powerful organizations called *merchant* guilds. Members of these guilds made a business of buying and selling and engaged in wholesale trade with distant places. The wealth and influence of one such group of merchant guilds provided the foundation for the powerful Hanseatic League that dominated the Baltic cities for centuries (see Hanseatic League). The merchant guilds had great influence in city governments, and their guildhalls were impressive buildings. Many of them still stand today. Some European cities had guilds for charitable and religious purposes.



The American guines fowl is fatter and slower than its less and long legged African cousin

GUINEA (Int') FOWL. Many lands of sulf gumes frow are found in Africa. The bards dense there name from a section of the west coast of Africa. The properties of the section of the section of the neutron of the section of the section of the coast from Greece. The common domestic gunsa foul of North America (Numula meteogras) introduced by the strip settlers in descended from one of the wild African species. There are these variet es—pearl white and lavender.

Since a uniforcement. Domestic burde cling to their wild habits and are than to mass for thair reason. They have then rests the national to make the thing the their rests the national to the theory burder to root in time the their particles of the project to root in time they destroy many insects about the fainward and are useful in protecting other poultry hard and are useful in protecting other poultry. They are glitters and the loud one willable shared of the mile Ries warning of intrufers. The female has a critical that counds the buck what Luck sheet. The dark gamy fiesh of the guines foul is considered and electory and finds a good market in restaurants and electory and finds a good market in restaurants and

hotels. The buds weigh 3 to 33 pounds at matunty. Wild gu nea fowls are of three kinds—those with a creet of ferithers on the head those with a boar helmet and a bare head and those with a patch of feathers on the back of the head. The domestic form is derived from the helmeted kind. Some of this kind

hve in Madagassear siso
GUINEA PIG This restless grumbling little rodent
is cur ously musaamed for it is 1110 sense a pig and
is not native to Guinea but to the Anlean highlands
of Peru and other parts of South America. Its real

THE USEFUL GUINEA PIG

The gumes p g is an important laboratory animal, used in preparation of serums and antitorins and an physiological periments. It breeds rapid y and is cared for easily

amme is the cory and it is related to the harse and rabbis II was domesticated in Europe in the 16th century and is frequently seen in the United States The cavy is about its inches long and evates in several vanieties some of which have short hair and others long cut outsly wilfield hair. The colors are varied usually black and white tan and white or a institute of all three. The sumular large gentle and amus ing and are heed as pets for chiefen. They are also in great demond as subjects for experiment in medical labors, demond as subjects for experiment in medical labors, demond as subjects for experiment in medical labors, the color of the color of the color of the thought of the color of the color of the change of the color of the color of the color of the days. The guiness pur breeds rap dly and is capable to bearing young when but a few months old. The

searchic name of the guinea pig is Cana porcellus QUIVAR (9/64") A stingned mussacl instrument, the guidar resembles the late. It is much used as an accompanisment to the voice in sunging especially in Italy and Spain. It was introduced into Spa in by the Moors. It has an extraing a livyed by the fingers of the right hand whils those of the left control the piech by presumed and the proposal which has frest specially controlled the control of the piech presumed and in the control of the three highest strings are usually of guit the three lovest of its layen over with allevered are

QUIL OF MEXICO. This great indentation of the halant of Seen more than 600 000 square mine in area is almost completely surrounded by the United States and New In the 450 mile states between In the 450 mile states between Yuestia and Flot dis part of Culia interposes The only prayeges to the open sea are the Straits of Yuestian 120 m les under and the Statis of Florida tarying from 04 to 100 miles under some state of the court of the Gulf in easures 1 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north to south 850 miles from 100 miles and from north 100 miles and 100 miles a

Most of the 3000 male coast is low and marrhy and is out used for much of its length by barren sand bars somet mes 100 miles long with salt lagoone she did the The only valuad in the Gulf are a few entil ones off the Yuestia coast and the lawarast Florida Kiegs. Then rure employing into it bring Goon anger all of them are blocked by great bars which make them accessable only to wester of the flow dark.

Because of the lox abores there are few good habors. The most tuportant are these of Key West Tampa Pennaroda Vlobule Galaceton Corpus Christ. Tam pace Vera Ceus and Havana From Florada to the Vaccean beauchary the slope of the basin is very gradual. Off the Advican coast it drops rapidly to the submarine plain known as Suybee's Deep which is about 12 700 feet deep. The todes are relatively small

The Gulf recruses a great influence on the climate of the Southestern states and the whole V is supply Valley II saturates the southerly wands blowing across it with mosture. The arr releases the mosture as man which falls most heavily on the coast and in smiller quantities as the wands more northward. The temperature of the Gulf waters is eight or nine degrees higher than that of the Atlantse.

#### GULF STREAM ·

GULF STREAM. In winter, travelers from New York to Bermuda may leave in blinding snow. During the night. as their ship plows southeastward, they encounter storm or fog The next day they find clear, blue water and milder temperatures because they have entered the Gulf Stream. This is a warm, blue current which flows from between Florida and Cuba northeast toward Europe. At the same time, the peoples of western Europe are enjoying far more important benefits from the Gulf Stream. The British Isles are as far north as Labradoi, and they receive no more heat from the sun. Bordeaux, France, is nearly as far north as Montreal. Yet

these and other parts of western Europe enjoy mild winters, while Lab-

rador and Montreal are subjected to intense cold. The difference is caused by comparatively warm westerly winds which blow over western Europe from the Gulf Stream (see Climate).

# The Cause of the Gulf Stream As explained in the article on the Atlantic Ocean,

the Gulf Stream is one of the great ocean currents which are caused by the same forces that give us chmate-particularly the planetary winds (see Winds). The trade winds over the Atlantic Ocean continually drive warm surface water into the Caribbean and

across this sea until the water reaches the Yucatan Channel between Yucatán and Cuba. Here the water can go no farther west because the waters of the Gulf of Mexico are in the way. The current is forced out, therefore, through the Straits of Florida between Florida and Cuba, a span of not quite 110 statute miles. This is considered the origin of the Gulf Stream.

The stream is then forced northeastward between Cape Florida on Biscayne Key off Miami and the Bahamas. The average flow here is estimated at 14 cubic miles, or 100 billion tons, of water an hour The aver-

THE GULF STREAM WASHES TWO CONTINENTS AMERICA

Here we see how the Gulf Stream is a continuation of equatorial currents deflected eastward by the Gulf of Mexico. The Gulf Stream proper begins between Florida and Cuba, moves with west winds to Europe, and is deflected northward into the Arctic. With its tributary currents, the Gulf Stream forms a vast eddy that encircles the Sargasso Sea, which is noted for its wide variety of marine life.

age speed is four statute miles an hour. This part of the Gulf Stream is called the Florida Current After merging with a similar current from the open Atlantic, the stream runs roughly parallel to the North American seacoast. North of Cape Hatteras it swings farther eastward, forced out by cold water close to the shore. The stream's surface temperature here is about 88° F. in summer and 79° in winter. Traveling ever more slowly, the main stream skirts the Grand Banks of Newfoundland and joins the North Atlantic Drift. Its temperature is still much warmer than the surrounding water, about 72° in summer and 50° in winter. Finally it crosses the North Atlantic to warm the British and northern Eu-

ropean coasts before losing itself in the Arctic Ocean. The Gulf Stream, discovered by the early Spanish navigators, was chartered and named by Benjamin Franklin. In 1950 and 1951 the Hydrographic Office of the United States Navy conducted an extensive survey of the stream with the co-operation of merchant tankers. This permitted accurate charting of the seasonal changes in the stream's course. (See also Ocean.)

GULLIVER'S TRAVILS Perhaps the most famous traveler in the hotry of the nord was Lemels Gullver. First a surpton and then a capta no fine call by S' fet the scelebrated voyager not exceed except in the mind of Jonathan S' to the like century suthor of Gullivers. Traves S are two century suthor of Gullivers. Traves S are two security suthors of Gullivers a Traves S are two so to the contract of t

The author a name d d not appear with the book when it was published n 1726. The t the page read Travely into several rezuche Nat one of the World by Lemuel Gulliver Many people took this ser outper Great numbers of travel books we e then beingpub.

I shed and many takes told in it see were hardly strang er than the imag nary adventures of Gull ver One sracapta n even cla med that he knew Captam Gulliver well. Other readers while they took the book ser ously condemned it as full of evages atoms

Gulliver's four vovaces take h m to lands ahab ted

cultures stour volyages take him to Lands anable of y strange being. Shi no cheef on his first volyage he finds himself east away in the country of Li pub, whose inhab taints are only are under still. Gul liver by reason of his great's resund strength a she to help the Lall put are, in many ways H is greatest feet is he single handed capture of an enemy feet threaten githe coast of Li liput.

GULLIVER AND THE HOUYHNHMMS



One of Gulli er s voyages took him o the councry of the Hearth hnms e s e of n s use horses These animals are served he disgus mg Yaho s ep ah carrentures of human by



On enothe voyage Gullivs was ed the Franc Island of Lanut and the py unvy you Lagedo in these mad gade few tal lease and the was more arrivable on manded the incoure sate a beyone be too slove to book with as less

On he second voyage Guil ver rea hes the land of Brobdengnag mhab ted by human benngs 60 feet in he ght These people are gratte and kind Guilhers constant compan on as bittle g I named Glumdai d tch Deep to her attent one poor Gui ver here has a terr fring encounter a it is giant pet span el ach chear es h noff n t mouth

H is the d voyage takes h in to several remote places including the Flying Island of Leputa. The ph loaophers of this hand are so absent-runded that they here boys to go about with them and roule them with rattles when their attent on wanders.

On he fourth and last trap Gulliver a set ashone by mut now as loss and finds himself in the land of the Hon halmuns (wh sea!) These are intelligent hourse with all the best qualit es of h man beings and none of the r wess The r se wants are Yahoos hornd haven beene with none but but qualit es Gulliver would ghalfy havel wed the rest of he life with the Hospyhalmus, but they regretifully send hum away

Gull were Therebs is actually a bing sature on human most and follows But team be read analyst as a story of strange adventures, and that is how many prophe choose to read; if For children a use the book as usually published in shridged form. Adults who wish to read; it should be sure to get the original years on [See at Sa ft].

## LONG-DISTANCE Flying Champions of the WORLD

Gulls and Terns. Long before airplanes flew over the ocean, gulls and terns were making transatlantic flights. Travelers declare that the same bird has followed their vessel the entire 2,500 miles from Ireland to New York, living on refuse thrown out from the ship, and occasionally resting on the waves. Bird banding furnishes more reliable evidence. Terns tagged in Labrador have been picked up in France and South Africa. Gulls banded in Germany and England have been found all the way from Labrador to Mexico.

Most of the gulls and terns migrate enormous distances between their winter and summer homes. The record for long-distance traveling in the bird world goes to the Arctic tern, which makes an annual round trip of 20,000 miles. It nests in the Arctic regions, and as soon as the young are grown the whole family departs for the Antarctie Continent. As one would expect in birds capable of such flights, their wings are long and powerful, so that they can make steady headway against the strongest gales. They have webbed feet, so that they are at home in the water and swim easily. Most of them are sea birds, but several species live and breed on inland lakes and marshes. They are exceedingly sociable and nest in colonies of thousands, sometimes millions. The nests are usually made of reeds, grasses, or seaweed and are built on the ground, on rocky ledges, or on the water in reedy marshes.

Gulls and Terns Compared

Gulls vary in length from 14 to 29 inches. The terns are smaller, from 9 to 21 inches long, and their bodies are slimmer and more "streamlined." Gulls have square or rounded tails; terns have long, forked tails. Gulls alight on the water to feed or rest; terns never do so, but hover and plunge for their food. Another distinction is that gulls usually fly with their bills on a line with the body, while terns carry

theirs pointed downward. The prevailing color of both gulls and terns is white below and pearl gray above In many species the head, wings, and tail are marked with black in summer months. The feet and bill are usually bright yellow or red. All gulls and terns are particularly fond of fish, dead or alive; but they will eat almost any other kind of food they find on the water or along the shore. Thus they are considered valuable scavengers.

Some gulls are friends of the farmer because they eat field mice and insect posts that harm crops and trees. In Salt Lake City stands a monument sur-

TERNS AS TOURISTS AND STAY-AT-HOMES





A common tern (top) shows how its long wings carry it tirelessly across the oceans as it screams down a resounding tee'arr, tee'arr. Its flight is flickering like that of a swallow. A black tern (bottom) stands ready to dart anyone who would disturb those eggs in the crude nest of sedges and grass.

mounted by the bronze figures of two gulls It was erected "in grateful remembrance" of the service rendered the Mormon settlers when in 1848, the California gulls came in large flocks and destroyed millions of black crickets which threatened to destroy the crops. The California gull is the unofficial state bird of Utah.

Franklin's gull is abundant in the upper Mississippi Valley, where it follows the farmer's plow in search of grasshoppers and other insects. These small gulls have black heads and throats, resembling closely Bonaparte's gull of the coasts and Great Lakes. Franklin's gull is rarely found on the coasts, however, and Bonaparte's is

#### TWO GULLS AND THEIR RHYTHMIC WINGS



i the top a ring b lied guil demonstrates the smooth sourhing thi that is that attentiated it to guils. Observe how it is after from that of the tera. He ow a Frankinn s gu! ha tighted gracefully on its nest of dead rushes hidden declighted gracefully on its nest of dead rushes hidden declighted the marshindand. Notice its dark hood and white epsidi

uncommon island on the praises. The bg hermals yell as the species most abundant along both cases and in the Great Lakes that the free follows show to feed on the general Lakes that it forten follows show to feed on the general Lakes that thrown overboard by the company when yellows and breaks then open by carrying them up into the a rand dropping them on rocks. In company with the herming gell will often be seen the slightly smaller rapp-lated qual.

The largest of the family at the great Mack-backer and write the Adulation of the United States and vents the Adulation of the United States and vents the Adulation of the United States and the winder The Control of the Control of

The common tern is found in all parts of the Northern Hem sphere as well as in South America and Africa With its pearl gray body white tail and black cap it is a beautiful bird The Arctic and Forster's terns can be distinguished from the common term only by an expert observer The royal tern is a common species on the southern coasts. It is distin gu ehed by its large size and in the breed ng season by a long black crest The black tern is a bird of the interior marshes and prairies where it feeds on insects during the nesting season With its black head and underparts and its slate-blue back wings and tail this small bird is easly mistaken at a distance for a purple martin

Two other types of terns-the noddy and soots terns breed on the Dry Tortugas off the southwest coast of Florida and winter in South America The sooty tern is black with white underparts and outer tal feathers The neddy is the only tern with a rounded tal It is dark brown with silvery head The least tern is the da ntiest of all sea birds Only about nine inches in length it s a pale blue color above and white beneath It was once so ruthlessly killed for its beautiful feathers that it came near to extinction and is still relatively scarce (For pictures in color of the common tern and the herring gull see Burds Egg )



Gulls and terms with about 50 species of each form the family Lardae Gulls belong to the subfamily Larnae terms to the subfamily Stermae Secent fic name of the herring gull Larus organizates of the com non tern Sterna kirundo of the least tern Sterna antillerum

GUMS AND RESINS. Natural gums are the solidified juice or sap of certain plants. True gums are soluble in water or else swell up in water, but do not dissolve in alcohol. The word gum, however, is sometimes applied to true resins or mixtures of gums and resins (see Resins).

About 150 different gums find industrial uses. They go into adhesives, sizing (glazing) for silk and cotton fabrics, calico printing, candy, and pharmaceutical products as an emollient (soothing to mucous mem-

branes) or as an emulsion.

Gums were once thought to be made up of carbohydrates. Now they are known to be composed of complex acids, called gum acids. When combined with dilute mineral acids, gum yields certain sugars. Gums are formed in shrubs and trees by conversion of cell tissues, most likely through the action of enzymes. In some plants gums are formed only when plant tissues are injured.

Perhaps the most important gum is gum arabic, which comes from the acacia tree (see Acaeia). Gum tragacanth is a hornlike substance from Asiatic shrubs of the bean family. It is sometimes adulterated with a cheaper gum, bassora. Mesquite gum comes from several different shrubs that grow on the dry plains. Cherry and plum trees yield a dark-colored gum which is insoluble in water.

Copal gums, used in varnishes, are actually resins. Among them is kauri gum, which is a fossil resin from the kauri pine of New Zealand. The copals of Zanzibar and the Congo are also fossil remains, but in Sierra Leone and the Philippines copal is tapped from living trees.

The balsams are classed as oleoresins. Sueetsmelling balsams from South America go into perfumes and ointments. Canada balsam is used in mounting microscopic specimens and in cementing lenses.

Gum mastic, a resin from trees growing on the Moroecan coast and on islands of the Aegean Sea, is used in making brilliant varnishes. Dragon's blood, a red resin used in photoengraving processes, comes from a ripe fruit of several Siamese and East Indian

palms. (See also Chewing Gum; Rubber.)

GUMWOOD. The red, or sweet, gum, the black gum, and the tupelo trees all yield the lumber known as gumwood. These trees are native to the southern swamp and bottom lands that arc dry for much of the year. The heartwood of red gum ranges in color from light to deep reddish brown. The sapwood (known commercially as sap gum) is nearly white. Tupelo and black gum are grayish white.

Most of the furniture made today contains some gumwood. It is cheaper than such furniture woods as walnut, mahogany, maple, or oak. The gumwood may be used as a base over which a veneer of other wood is laid, or else the gumwood itself may be sawed and finished to bring out the best quality of its grain. Red gum, when quarter-sawed, has a mahogany-like grain and can be finished to resemble oak, eherry, walnut, or maple. It is widely used as a substitute for the expensive Circassian walnut. The wood's

tendency to warp is overcome by expert cutting and seasoning. Red gum is also used as a veneer. Inferior grades of gumwood are used for boxes and erates. (See also Veneer; Wood.)

GUNPOWDER. The origin of gunpowder is unknown. Very likely no one person invented it; rather, its formula and uses were developed gradually from various "fire" substances. These were long known in many countries before they were adapted to military use.

The Chinese early had a knowledge of some such fire substance. "Greek fire," first used by the defenders of Constantinople against the Saracens in 673, is believed to have been similar to gunpowder. However, it was not used in projectiles but was simply set on fire and poured or hurled on the besiegers beneath the walls. The English Franciscan friar Roger Bacon and the German monk Berthold Schwarz, both living in the 13th century, described the composition of gunpowder (see Baeon, Roger). Its use in cannon is mentioned in the records of the city of Florence for the year 1326. Cannon may have been used in the battle of Crécy (1346); but they could have done little more than frighten the horses and men.

The first important use of gunpowder was to blow up or batter down the eastle walls of rebel barons. Thus they could no longer shut themselves up and defy their king. Later, gunpowder was used in small arms, helping to make the eommon soldier with a gun more deadly in war than a mounted knight in armor.

The gunpowder of the early days was much the same as the common black powder of today. It consisted of a mixture of saltpeter (potassium nitrate, or niter), chareoal, and sulfur. The proportions of the chemicals have varied greatly from time to time, a

AN EARLY SIEGE GUN IN ACTION



This siege gun of the 15th century was one of the first to make effective use of gunpowder. The cannoneer in the center is looking at the target through a primitive view finder.

fair modern standard being 75 per cent saltpeter 15 per cent charcoal and 10 per cent sulfur. These ingredients are ground to a fine dust thoroughly mixed into a moist paste pressed into cakes and dried. The cakes are then broken by rollers into grams of varying size which are glazed by friction against each other in revolving barrels. The charcoal used in gunpowder is specially prepared from dogwood willow or alder. All operations are carried on in small separated buildings so that the danger of great destruction by accidental explosions is reduced to a considerable extent

Except for blasting work and for certain spec al military purposes the old style gunpowders have been almost entirely replaced by the amokeless powders and the high evplosives such as guncotton mercury fulminate nitroglycern and dynamite Smokeless powders (products of guncotton and natroglycerss) were first perfected in 1884 and put to military use by the French (See also Dynamite and Nitroglyconn

Funlosives )

GUSTAVUS ADOLPHUS KING OF SWEDEN (1594) 1632) For 12 years in the first half of the 17th cen tury Germany had been devestated by the Thirty Years War Towns had been destroyed men wom en and children massacred and the country plun dered Everywhere the Catholic and imperialist party was triumphant and it seemed as though the Protestant faith would be swept out of the land Then in 1630 the tide was completely turned by the appearance of a new leader for the Protestants-

Gustavus Adolphus king of Sweden one of the greatest generals in the history of warfare

Born in Stockholm vastle Gustavus Adolphus was the son of Charles IX. He had been trained from childhood for his kingly dutes. When he was only mme years old he began to take part in public affairs and m 1611 at the age of 17 he had mounted the throne as Gustavus II So earefully had he been trained that before he was 20 years old he had won a war against Denmark and by 1630 he had extended his kingdom around the whole eastern shore of the Baltie by successful struggles with Russia and Poland (See also Sweden )

Gustavus Adolphus was led to enter the Thirty Years War not only because he was an enthusiastic Protestant who hoped to reheve the musfortunes of the Protestant cause in Germany but also because he dreamed of extending his kingdom even to German shores so that the Balt's might indeed become a Swedish lake France under Cardinal Richelieu as numster gave him money for his expedition to further

French pol tical sims

When Gustavus landed in the north of Germany his army was not large but it was well trained and disciplined. He was the greatest military genius of his time and set on example for modern leaders by supplying his men from fixed bases instead of lesving them to hve off the country by foraging and pillage At first he was coldly received by the Protestant rulers of Brandenburg and Saxons but they were brought to the r senses after the awful destruction of



### GOING TO PRESS IN THE OLD DAYS



What a contrast between the primitive machine shown here and the great modern high-speed presses shown in the article Books. Gutenberg is showing one of the sheets from his press to Johann Fust, one of his partners in the printing firm at Mainz. This

simple machine, merely a development of the o'd-fashioned cider or cheese press, remained in use without improvement for a century and a half. Only two pages of a large book could be printed at one time on such a press.

Magdeburg by the imperialist forces and the foolish religious policy of Emperor Ferdinand II. In the famous battle of Breitenfeld, near Leipzig (Sept. 17, 1631), Gustavus overwhelmingly defeated the imperialist army under its famous commander Tilly.

Gustavus then pushed westward, through the "priests' lane" of rich bishoprics and monasteries of the river Main, to Mainz on the Rhine, where he established his brilliant winter court. In the spring he again took the field, and a second time defeated and now mortally wounded the aged Tilly in Bavaria. In this emergency the Emperor took the humiliating step of recalling the imperialist general Wallenstein, whom he had dismissed just after Gustavus had landed on German shores.

After weeks and months of maneuvering, one foggy day in November 1632, Gustavus succeeded in bringing Wallenstein to bay at Lützen, only a few miles from the site of his first great triumph. Again the Swedish troops gained the victory, but the battle was won at the cost of the life of their beloved king, for Gustavus fell wounded into the hands of the enemy and was dispatched as he lay. He was the greatest king that Sweden ever had. With his death "all moral and religious ideals died out of the Thirty Years' War," and it became a mere struggle for political power. (See also Thirty Years' War.)

GUTENBERG, JOHANN (1400?–1468). Neither printing nor movable type was actually invented by Johann Gutenberg. Nor did he print the first book. But Gutenberg made printing practical, and his achievement stands as one of the greatest advances in civilization.

Gutenberg was not always so recognized. The facts of Gutenberg's life were so little known that historians gave the names of other men in Holland, Italy, France, China, and Japan as being the first printers. But historians are now agreed that the honor of the title "father of printing" should go to Gutenberg, an obscure German goldsmith.

Before Gutenberg, printing was used only to reproduce pictures, playing cards, designs on cloth, and similar items. The designs were cut in woodstone, or metal, and transferred to parchment or vellum. Sometimes a few words of explanation were cut into the printing block, but that was the limit of text printing. Books were copied by hand by monks or professional copyists.

Gutenberg's Life and Work

Gutenberg was born in Mainz, Germany, about 1400. His father was Friele zum Gensfleisch, a go'd-smith. Johann took his mother's last name for his own, following the custom that one son should carry on the mother's family name. His father was entrusted with stamping designs on gold coins, and this may have given the boy the idea of printing from metal. After his father's death, Johann moved to Strasbourg. There he worked as a goldsmith and maker of mirrors, and also served as a policeman. In 1438 he became a periner in a block printing firm. During those years he experimented with wood and metal type.

Gutenberg probably did not know that the Chinese had printed from movable type about A.D. 1040, later discarding the method. He invented movable type all over again for the Western world. He used sand molds

to cast his type and changed the woodcut presses to take printing of type pages. About 1444 he returned to Mainz to set up his own press.

At first he produced more scrays of printing such as pages of prayer His first book was a Late gram mar printed about 1446. In 1450 he went into partnership with Johann Fust and Peter Schoeffer in this shop he set type for a Bible Before it was printed he quarried w this partners and withdraw from the firm. Fust and Schoeffer printed the B blo from the tyres set by Gutenberg.

Gutenberg then set up his own press and in 1457 printed the Bamberg Bibble Later he printed a reh good grammar and the Catholican a rehigious do-tionary. In all he produced only about 50 pieces of printing. In 1465 he was granted a pension by the Archbishop of Mains in recognition of his printing.

for the church He ded in Mainz in 1468

Today the few comes of the Gutenberg Bibles that remain are the world a most valuable books. The first set by Gutenberg and printed by Fust and Schoeffer 18 known as the 42-1 ns Bible because most of its pages are 42 lines long. It was printed in three volumes The Library of Congress has a complete and perfect set There are 23 other volumes in American libraries and museums Only 16 cop es of the Bamberg B bls with 36 lines to the page remain GUTTA PERCHA (gul 4 pur ch4) Most of the ocean cables which link the nations of the world are covered with gutta percha the juice or milky later of a tres which grows in the Malay Peninsula in Borneo Java Sumatra and the Philippine Islands It is more familiar to us in the form of rubberlike covers of golf balls in some knife handles in adhesive and waterproofing materials in protective clothing for chemical workers, in dentel packing and dental plates and in certa n kinds of surgical instruments It makes the best cable covering because it is tough strong and stable under water and is highly insu lating It is somet mes used as a substitute for rubber or 13 mixed with rubber to make the rubber plastic

Gutta-percha is gathered like rubber by spoping the inner bark of the tree. However a gutta-percha free must be 30 years old before it arealy to be tapped. A tree may give from a few ounces to three or more pounds at a tapping mostly from the bigher parts of the trunk. The gutta is washed from the data of the stand modified into compart ables by being immersed in hot water and keeside with the hands. Gutta is stored under water to present our

dation which makes at buttle.

Cultivated trees give the best yield. Some can be tapped more than once at intervals of parlang two years so the native method of felling the tree to collect the giun is wasteful and the Malayan govern ment attempts to prevent it. Tapping provides the birst guita but it may also be obtained from the keaves twigs and the ends of the smaller branches by cutting granding and boiling. The gatta separates in the boiling and rises to the total.

Rubber balata chiele jelutong and other products are all related to gutta in general chemical composition and all come from tropical plants. Gutta unlike rubber is not elastic but it is plastic when warmed and can be molded or rolled into sheets.

The guita percha tree grows in scattered patches among other trees generally near the coast line. The long narrow pointed leaves are a smooth dark green and have small white blessoms near the ends of the branches. The guita-percha comes from the tree Palaguum oblongifolis of the family Supplaces though many other species contribute to commercial

gutta percha

CYPSIES In Europe and America a httle-known people preserve an ancient and dist net way of life. These people are the gypsies who have been wan decrea for nearly a thousand years. During the warm months small bands of them are constantly on the move. In the United States and Canada they travel by automobile and sleep in tents or trailers at might. In Europe many of them traval and I was in a horse-drawn caravan a kind of house on wagon wheels During the worther gypsies live in house spartments and even empty stores but in the spring they resume their travels. In re not time some gypsies have settled permanently but they live apart from their nongypsy neighbors.

The gype et are usually short slum and swarthy. The women dress gally with red and green scarges and saches and heavy glittering jessity. The men also like bright colors and jessiely. Children dress largely in reas and casteff eighting and rum barefoot throughout the summer. Gypsy standards of hygens and diet are primitive but the people stay.

bealthy as long as they remain outdoors

On the road gyps es earn the r hving by peddling by mend ng (tinkering) pots and pans especially copperware and by telling fortunes at small fairs and camivals. They gather herbs in the woods and sell them. Many gyps es are mus cal and have remark able soft taught skill at the violin

Proud elannish and devoted to their traditions the gypsers have resulted attempts to make them like other people. Their children attend echool only to comply with local s hool laws for gypse se fear that formal education will make children forget gypsy ways Many older gyps es cannot read or write a mbat they know of themselves and their past is largely

communicated by word of mouth
The Gypty Past

In contaminat Europe the gypses are called tugame (the selling varies from country) to country).
The word gypsy is a corruption of Egyptian and
gypses his to think that their ancestral home is
Egypt. Actually they originated in northwest India
They had been one of the nomed a tribes of that region and for continue to 1000 they ventured was
the continue to 1000 they ventured was
the continue to 1000 they within the continue to 1000 they within the
Byranine Empire By the 1300 s they were
established in the Bilkans and Hungary

Here some of the gypsies settled as serfs on the lands of noblemen and churchmen. Others were given permits to wander. These wanderers became tinkers, wood carvers, and minstrels. The men panned for gold in the rivers, and the women told fortunes. By about 1500, gypsy bands reached the British Isles. There and in western Europe they added horse trading, horseshoeing, and care of sick animals to their trades. They developed the reputation of being shrewd and tricky, and they often indulged in petty thievery. Yet their skills at tinkering and animal care were sought after, and outsiders were delighted by their violin music and their mysteriously accurate predictions with the tarot fortunetelling cards.

Gypsy Language, Government, and Religion

The word rom, or man, gives the gypsy language its name, Romany. There are many dialects of Romany, but all are based on Sanskrit, the ancient language of India. Wherever they have lived, gypsies have absorbed many of the local words into Romany, and from Romany have come such slang words as pal, for friend.

Gypsies have always been subject to national and local laws; in addition, they enforce obedience to their own customs. Each band has its own chief; a so-called "king" is merely the head of a large band and has no power over another band. The chief acts as head of a tribunal that punishes offenses against gypsy law, and he deals with outsiders who have business with his band.

There are Moslem, Roman Catholic, Orthodox, and Protestant gypsies. Their choice of religion has largely followed the prevailing faiths of the coun-

GYPSY GIRL AND HER CARAVAN



In camp this girl cleans her kerosene lantern. Notice the elaborate carving on the caravan and the houselike furnishings within.

tries in which they have lived. However, they have their own baptism, marriage, and burial ceremonies which they practice in preference to the rites of their church.

Among the books which have been written about gypsies, some of the most interesting are George Borrow's 'Lavengro' and 'Romany Rye', stones of gypsies in England; W. F. Starkie's 'Raggle Taggle'. an account of a scholar-musician's wanderings with gypsies, and Konrad Bercovici's 'Story of the Gypsies', about the life of Rumanian gypsics. The Gypsy Lore Society has branches in Europe and America and makes scholarly studies of gypsy life.

GYPSUM. The abundant mineral gypsum is composed of calcium sulfate in combination with water. Its chemical formula is CaSO<sub>4</sub>·2H<sub>2</sub>O. Translucent varieties are known as selenite, and very fine grades of the material, of white color and special luster, are known as alabaster, valued for making statuary and ornaments. This is not to be confused with the alsbaster of ancient times, which was a fine marble used for vases and ornaments. Most commercial gypsum occurs us rock gypsum, which is mined from thick beds like those of coal. Some surface deposits are found, others occur far below the surface. Gypsum beds hundreds of feet thick are found in west Texas over hundreds of square miles.

Ocean water contains much gypsum. Most gypsum has been formed by precipitation from water that was cut off from the sea and later dried up. Large crystals of selenite are sometimes found in caves, as in the Mammoth Cave in Kentucky. Many so-called "hard" waters contain calcium sulfate.

Gypsum has been used as a plaster and building material since early Egyptian times. When heated it loses part of its water of crystallization. At this stage it is often called plaster of Paris. If it is then mixed with water, it becomes plastic and takes up the water again, recrystallizing to form a soft yet right comentlike material. Alone or mixed with sand or lime this can be molded into casts, stucco, tiling of finishing plasters; or made into lath, wallboard or blocks. Stage and motion-picture settings and similar temporary structures are made of gypsum wallboard and plaster of Paris, as are the casts used hy sculptors, surgeons, and dentists.

A mixture of gypsum plaster with a little cement dextrin, and tow (coarse flax or hemp) to give it strength forms a light building material called "staff." This is much used in constructing temporary buildings. The material is so light that wood instead of steel framework may be employed.

Gypsum wallboard and tiling resist fire and water well, and they insulate a building against both heat and cold. Such boards or blocks can be nailed and sawed like wood, replacing wood for many uses. Artificial gypsum, formerly a waste product in phophate fertilizer manufacture and other chemical industries, is used in making building tile. In the United States gypsum deposits are worked in New York, Iowa, Michigan, Tenas, and many other states.

### SPINNING TOPS that Guide SHIPS and PLANES

CYROSCOPE. The symming of a top the restation of the earth on its airs the whiring of a rife bullet cont-first toward its target the long subang flight of a spiral point down a forothal field—these are all common illustrations of that peculiar phenomenon, that scentists call groscope, force Suitable harnessed has force will keep an airplane flying enright and evel without a hand on its controls or guide a shap in its course despite wind or waves or permit a makey are full of people to run straight or around curves at high spreed while balanced on a ungle rail. Any object spinning around its arou will develop groscopie force but the best illustration of the oriments amounted in promoted by the toy groy top

night angles to the direction in which you push it.

If you try to force it around borizontally to the right or the left it will move up or down and if you try to push it up or down it promptly moves horizontally.

Thus you have illustrated the two great gyroncope punciples which apply to every rotating body per set has rapidity as space which tends to keep its are possing count mously in the same direction and second when this space rapidity is disturbed the rotation body tends to turn so that points on its rim will be moving in the same direction as the disturbing force. This last is called the principle of procession.

This explains why spinning tops stay erect and

volved is provided by the toy gyro top why planets or rifle bullets do not turn end over end
SOME OF THE OUTER ANTICS OF THE GYROSCOPE



He a demonst and the greeness release by the state of the



which is essentially the same as the common laboratory gyroscope. This consists simply of a heavy wheel with its ade privated inside a ring. The ring in turn is protect in a gimbal frame as shown in the piture in the middle of this page. Such a mount in gremats the wheel to be tupped and it med in every possible po iton and direction

So long as the wheel is not rotating it offers of cour e virtually no reastance to being tupped and turned. But now let us set the wheel spinning by winding a string around the axle and it en pulling it away sharply immed ately the gyro-wheel seems to become imbued.

with a strong and perverse will of its own Fek up the stand and walk around with it No matter which way you turn the acts will continue pointing in the direction it had when it started spinning. Set the stand back on the table and try with your finger to push the end of the acts out of its po itson. Not only will it reast you but it will stubbounly move at in flight Also it explains how the earth under the conflicting attraction of other hearenly bodies wobbles slowly on its axis producing among other effects what is called the precession of the equinoves (see Earth Equinov). In practical use gyro-wheels are usually electrically driven. When well bulanced they are ensuited to

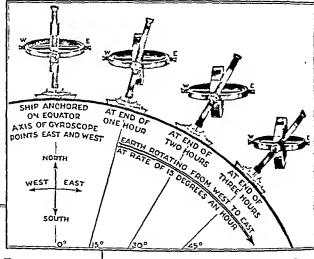
real relation to the control of the

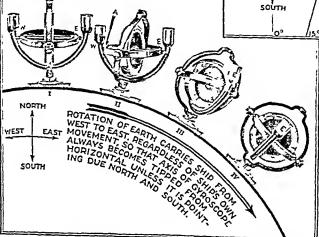
present ships from rolling with the wates while other traft which have to break their way through see are made to roll by oscillating gyro-wheels. The turn-and bank indicator on many airplanes

The turn-and tank indicator on many airpanes as a simple gyroscopic device which tells the pilot flying through darkness or fog when his ship gets off its stra ght and level course. The mechaviator is a

## HOW A GYROSCOPE IS TURNED INTO A COMPASS

To understand the picture at the right imagine yourself suspended in space and looking at the earth from south of the Equator. A giant gyroscope ahoard a ship is heing carried around hy the earth's rotation. The gyro-axis W-E points east and west. For the sake of simplicity in picturing angles, we have anchored the ship on the Equator, although, as the next picture shows, the ship's position or motion would make little difference. As the gyroscope is carried around, note that its "rigidity in space" holds the wheel parallel to its original position, so that the W end of the axis, still pointing west, dips more and more toward the earth. Now study the picture helow. The original conditions are the same, except that a U-tube with enlarged ends, containing mercury, has been fastened to the axis supports of the wheel's frame. As soon as the west end of the axis starts to dip toward the earth, the mercury under the leveling force of gravity flows to that side of the tnhe. This results in a greater downward pressure on the





DYRO WHEEL N CASE

In this Sperry compass, the gyro is part of an electric motor and is kept spinning about 6,000 to 8,000 times a minute inside its case. A pair of mercury containers B on each side correspond to the ends of the U-tuhe in the previous picture. The tuhe T connecting each pair is so small that mercury will not flow the rapidly back and forth as the ship rocks, hat will respond only to prolonged tipping of the gyro-axis. When this happens, the gyro precesses, and the motion is communicated by its vertical supporting ring through electrical contacts to an auxiliary motor which keeps the compass card aligned properly with the gyro.

more powerful device connected to the controls so that the plane's dips and turns away from the course are automatically corrected.

In 1911 Elmer A. Sperry, of Brooklyn, demonstrated the practical value of his now famous gyrocompass. How this device manages to harness the force of gravwest end than on the east end of the axis. Precession, as illustrated with finger pressure on the previous page, sets in; and what was the west end of the axis turns toward the north. The turner continues until the mercury is balanced in the U-tube, a condition that can only exist when the axis of the gyro and the axis of the earth are in the same plane, or, in other words, when the axis of the gyro points in exactly a north-and-sould direction. For purposes of illustration, the angles assumed by the gyro in the pictures have been greatly exaggerated.

ity to a gyro-wheel so that the axis of the latter will always seek the north-to-south line is explained by the accompanying pictures. Gyrocompasses are now the standard equipment on all large ocean-going steamers since they are free from the faults of the older magnetic compass (see Compass, Magnetic). The gyro-pilot, which sailors call "Metal Mike" or "Iron Quartermaster," is an automatic steering mechanism connected to the master compass. It corrects each small drift or yawing of the vessel, holding it more closely to its course than could any human helmsman (see Navigation). The controlling mechanism can be disconnected whenever it is necessary to steer by hard as in passing ships or entering harbors Aviation instruments based upon the

principles of the gyroscope include not only the gyrocompass and the gyropilot, but also the artificial horizon and the directional gyro (see Airplane). Gyroscopes also hold torpedoes steady on their course.

The first gyroscope was suggested in 1836 by Edward Sang as a device to illustrate the motions of the earth. Jean Foucault actually made one in 1852, and gave it its name, at the same time starting the studies upon which our knowledge of its action rests.

HAARLEM, NETHERLANDS Five miles from

In the North Sea hes the sty of Haarlem capital of the province of North Holland During the Notherlands revolt against Spain it was the seene of one of the bitterest seeges in history Taxes the Spainth army stormed its walls and both times the Spainth army stormed its walls and both times the townspeak force of the state-ker The Spaintards the townspeak force of the state-ker The Spaintards that seems to the cut. The Dutch food supply the sea has been been to the Dutch to the state of the state

After seven months of asge the defenders agreed to surrender in July 1573 In return the Spanish commander promised mercy. But when the invaders entered the ety they shaughtered more than 2 000 of its citizens. In 1577 William the Sident prace of Orange freed Haarlem from Spanish rule and the ety became near of the Murthe Metherland.

The modern city lies in the heart of the bulb-grow ing distinct In spring thins and hyaembla spread a brilliant carpet of blossoms around the city. Their bulbs are exported. Haarlam's industries include the manufacture of cotton goods printing brewing and

construction of atreeteers and roule ay carrages. The city is slashed with canals and dotted with gabled houses. The Cathedral of 5t. Bavon called Groots Kerk ('great-church') dates from the late 15th century. Another place of interest is the Fleshers' Hall (meat market) built in 1603. Tourists also enjoy.

the monument eretted in 1950 to comment orate the legend of the boy who held his finger in the dide to hold back flood waters. Hardem was the home of Laurens Coeter printer, and Frans Hals artist (see Haly) Population (1947 commy), 156 856 HABEAS CORTUS (As 152-45 M/rp). When a pulson is held presoner against his will a judge may upon in held presoner against his will a judge may upon reasonable demand since an order compelling the jailer or other easted all summy the prisoner to corte and found the presoner as released. The court order is called a wit of habeas corpus often known as "the great writ of the try".

The term habes corpus comprises the first two words of the old Latti negal form which said "Thou shalt have the person" of the accused in court at such and such a team. The principle of the writ is of English owigin for in Magna Carte King John was forced to prome that "to five man shall be taken or improved evcept by the lawful judgment of his peers and by the law of the land Under thus principle no one could be arrested and held in confinement on mere assenced without being formally accused of a crime

This remained one of the mainstays of English bberty until Charles! I set by the claim that a royal command was a sufficient answer to a writ of habesa corpus This misguided policy with similar arbitrary acts cost the king he hie The regult was that under

THE TOWN SQUARE IN HAARLEM



ion picture theater, hamed for the great Dutch palater Rembreadt line status of merebic type for hunt.

Ra is heliered by some to have preceded Gutenberg to the use of merebic type for hunt.

Charles II the famous Habeas Corpus Act was passed. It extended the principle to mean that any person imprisoned to await trial for any crime except treason or felony could demand and obtain his freedom under bail. Bail is the pledge, or bond, of some responsible person to pay a fixed sum of money if the accused person fails to appear for trial.

The amusing manner in which this law passed the House of Lords is told by Bishop Gilbert Burnet in his memoirs. The lords who approved the bill had all filed out, as is customary when voting, and were returning to be counted as they entered the door. "Lords Gray and Norreys were named to be tellers," says Bishop Burnet. "Lord Norreys, being a man subject to vapors, was not all attentive, so, a very fat lord coming in, Lord Gray counted him for ten, as a jest at first; but seeing Lord Norreys had not observed it, he went on with this misreckoning of ten, so it was

reported that they who were for the bill were the ma-

jority, though it indeed went to the other side." The Constitution of the United States declares that the "privilege of the writ of habeas corpus shall not be suspended, unless, when in cases of rebellion or invasion, the public safety may require it." The privilege was suspended by President Lincoln during the Civil War, at first without the sanction of Congress. In 1863 Congress voted to give the president that power. Later the Supreme Court ruled that the president does not have the power of suspension unless specifically authorized by Congress. All state governments guarantee the writ except Louisiana, which bases its legal system on the Napoleonic Code. This code makes no formal provision for such a writ. HABIT. Man would be in a sorry plight if he were unable to form habits. Everything he did would require watchful attention. Washing, dressing, and eating would occupy all his time. His hands would fumble at buttons, and tying his shoelaces and necktie would be as difficult as if he had never made a knot before. At the end of the day he would be exhausted by the continuous effort of concentration on the petty details of every action.

Fortunately for us, "practice makes perfect." We learn to perform mechanical tasks so that we can repeat them again and again without further thought. Thus while we are dressing, we can carry on a conversation about other things. Many women can knit without looking at their needles and read a book at the same time. Houdini could juggle four balls while solving problems in arithmetic. Habits governing general conduct are equally valuable. They keep us to a routine, regulating the time of our rising and going to bed, our hours of work and play, and so relieve us of the strain of always making decisions. Because of the regularity of habits, we are able to rely on the actions of our associates. Without the assurance that people will behave today very much as they did yesterday, co-operation between men and orderly government would be impossible.

Habits begin developing in early childhood. Some are acquired by observing and copying the behavior

patterns of other people. We learn to smile when others smile and to speak as others do, even to the extent of acquiring their accents. Simple motor habits, such as buttoning our clothes, are learned by a process of trial and error. Successful movements are repeated until a habit is formed. Complex patterns of activity, such as reading, writing, and professional skills, are acquired by doing certain acts carefully and repeatedly without variation. In learning to play a piano the student must at first think of each separate note and key and finger. Gradually he learns to coordinate the various acts so smoothly that he is not aware of the separate movements. Each step automatically supplies the stimulus for the next in a continuous chain.

If we want to acquire a new habit or break up an old one, two important rules must be followed. First, we must launch ourselves strongly on the new course and seize the first opportunity to act on our resolution. Second, we must allow no exception to occur until the old habit is broken or the new one firmly rooted. Each lapse is like letting fall a ball of string we have been laboriously winding up.

In addition to everyday motor habits such as walking and talking, people also develop mental and moral habits. These are characteristic ways of thinking or acting in response to certain stimuli. The honest man does not think of stealing even though money may be within easy reach. Through the years he has acquired the habit of honesty until he is no longer conscious of making such a decision.

Groups of people also build up similar habits. In a well-ordered democracy citizens accept the verdict of the majority of voters in an election. On the other hand, blind obedience to a dictator or monarch is also largely a matter of habit. Such habit patterns have a great influence in shaping the character of an individual and the culture of a group.

HADDOCK. The common cod has a close relative in the haddock. Of the two, the haddock is the smaller fish. The average weight is 2 to 4 pounds. The maximum weight is 15 pounds. The haddock has a smaller mouth than the cod and a black lateral line in place of the white line on the cod.

The haddock lives on both sides of the North Atlantic Ocean, ranging in United States waters from Maine to New Jersey and off Cape Hatteras. Spawning occurs from January to June on the offshore banks. The eggs hatch in about 13 days.

Though less important than the cod, the haddock is one of the world's great food fishes. In the North Sea it constitutes nearly half the total catch. It makes about one sixth of the total New England catch by weight and by value. It is caught on the same grounds and in the same ways as the cod (see Fish; Fisheries).

Smoked haddock is known as Finnan haddie. The process of smoking the fish originated in the middle of the 18th century at Findon, a fishing village in Scotland. Originally the product was known as "Findon haddocks."



In the puting by h Feder k Lenhau Romes is guidag Fettepheur h de ed Putin 19741 / November 1984 and Desser of Wilson Lend best had been for United to the puting and Desser of will cause the est his boots and been fust dung the twoodrahe of daught a speeds of the before see hate to un to lided to

HADES (ha de) When the three g extest goots of Creek mythology so the story goes of wided the world better and the season of the sea while. Hades go ned sovere gray over the world better and the sea while Hades go ned sovere gray over the unders orld. Here in the realine of distances Hades at enthrone I with his wife Penegol one and ruled the prits of the dead. He possessed a belinet able bendered him myssible. The Greeks y clured han as of stern and gloomy aspect not to be moved by prayers and flattery. No temples were decicated to him and where assertizes were offered to him the cere-

nonies were dismal and only black an mals were used. So hated and feared was Hades as the god of the dead that the Greeks dreaded to call him by h s real name. In later times they gave him a more kindly character and called him Pluto giver of wealth for they believed that he controlled all the precious

minerals that lay hidden in the depths of the earth and even the grain that springs forth from the ground

The term Hades came to be applied also to the abode of the dead This was gen erally thought of as a place where the souls of the good and the evil alke led a dim shado vy existence though there also grew up the idea of Elysum or the Elystan Felds a parad se for those deserving special reward and Tartarus a deep pit. under Hades where the wicked dwelt in eternal torment Before pass ng into Elys um souls drank of the waters of Lethe the river of oblivion that they might forget the r SOTTONS

To enter Hates the dead erre ferre de cross the Rues the Yes by the beatman Charon Only the e who had resured proper burnal were allowed to go across and if a body remained unburned the shade must wander on the bank for a hundred years before cro sing. On the farther after of the Styr atood the part of the Styr atood the years that of the years that years that years the years the years that years the y

HAGUE (hag The The third largest city of the vetherlinds and its govern mental center The Hague hes in South Holland about

tuom les from the North Sea. It has been the seat of the legitature and the High Court since the 16th century. But Amsterdam is compilered to be the captal (hoofdstad or head city) because the constitution requires that the king or queen be consent there.

The Hague is normally the royal residence and it was for long the diplomatic capital of Europe Since 1899 it has been the seat of the international court of arbitration or Hague Tribunal for which Andrew Carnerre but a selemit of alace.

The original Dutch name of the city was a Giny change (the counts forest) which is shortened to den Haag. The name comes from the fact that long ago the counts of Holland had a bunt ng preserve there. The city was once in a heavy wood Only a 1 title patch is left between The Hague and Scheveningen the country a popular seasand resort.

Broad shaded streets, intersected by many picturesque canals, and fine old buildings make the city one of the most attractive in all Europe. Its greatest pride is in its celebrated picture gallery, the Mauritshuis, which has many beautiful and world-famous pictures. Here are masterpieces by the Dutch and Flemish artists Rembrandt, Rubens, Van Dyck,

Vermeer, and others. There is also a fine gallery of modern paintings collected by the Dutch painter Hendrik Willem Mesdag. Population (1947 census), 532,998.

HAGUE PEACE CONFER-ENCES. Before the first World War, the most promising movements for world peace were two conferences which met at The Hague in 1899 and 1907, on the call of the czar of Russia. Twentysix countries, including the United States, attended the first, and almost twice that number were represented at the second meeting.

The chief objects of the conferences were to secure an agreement for the reduction or limitation of national armaments, and to formulate a plan for settling international disputes by arbitration instead of war. None of the great powers, except the United States and Great Britain, was especially eager to limit its armaments; the German delegation refused to consider any such scheme. The first object

of the conferences, therefore, was not attained.

The Hague Conventions

The conferences proposed 13 agreements or "conventions" concerning international disputes. Included were regulations which defined the rights of neutral nations and outlawed such military tactics as naval bombardment of undefended towns, and the use of poison gas and aerial bombs. Since none of these agreements was ratified by all the powers concerned, they were not considered binding. Most of their provisions were disregarded in the first and second World Wars.

The conferences also drafted a plan for optional arbitration which led to the Permanent Court of Arbitration (the "Hague Court"). This consisted of a panel of judges from the member states. When two nations quarreled, as over a boundary line, they could request a judge to arbitrate the dispute (see Arbitration). When the League of Nations established the Permanent Court of International Justice (the "World Court") in 1920, the older Hague Court nominated candidates to the World Court bench. Under the United Nations charter, the two older courts were virtually merged into the new International Court of Justice.

HAIL. The rolling white squall cloud that you sometimes see at the beginning of a thunderstorm is a "hail factory." The air in it is whirling along a line parallel to the earth. If a raindrop is caught and carried up high enough it turns to snow. When it comes down it is coated with water; on rising again, it freezes. The longer it travels the larger it gets;



This majestic building houses the International Court of Justice, which was established by the United Nations in 1945. It was built earlier for the Permanent Court of Arbitration and later it housed the Permanent Court of International Justice (the "World Court").

each coat freezes in turn until the mass of ice is so heavy that it falls to the earth in the form of hail. The more violent the whirl, the larger the hailstone will be before it falls. Some have been seen as large as eggs and there are records of storms in which hail covered the ground to the depth of a foot. Great destruction sometimes attends such storms, animals and even men being killed.

Frozen rain is sometimes called hail when it should properly be termed "sleet." Soft hail which sometimes falls in winter is merely a form of snow. Real hail is always a part of a thunderstorm, and therefore is most likely to occur on hot summer afternoons.

HAIR. Any animal which has hair is a mammal. Such animals also have backbones and suckle their young. No other animals have hair. The amount of hair and where it grows is quite different on different kinds of mammals. On such animals as dogs, sheep, cattle, and horses the hair covers the entire body in a thick coat of fur. On such mammals as the whale or hippopotamus only a few hairs are found. Animals which

coat of fur. On such mammals as the whale or hippopotamus only a few hairs are found. Animals which live in cold regions usually grow heavier coats of fur than those which live in warm or hot climates. Many animals grow thicker coats of fur in the winter than in the summer. Hair is not always soft and long. In hogs the hairs are stiff bristles; in the porcupine

and hedgehog they are enlarged and toughened so that they form a protective coat of spines or quills In human beings no hair is found on the palms of the hands or on the soles of the feet. There are about 1 000 hairs to the square meh on the realp or 120 000 hairs on the whole head The hair of bumans is con

haired woolly-ha red and frizzy haired peoples is usually black the varying shades of brown or yellow are found only among the wavy haved peoples Red har occurs regardless of hair type or race Straight hair grovs longer than the wavy type

woolly hair is shorter Wavy hair on a man if left uncut may grow somewhat more than a foot long a

woman s hair will usually gro v to twice that length although growths six feet long or more have been known Among straight haired and woolly haired peoples the seves have about the same length of hair

Baldness or alopecta of the

common type has a charactenstic pattern of development It starts in the har line shove each eye or at the top of the head These areas gradually increase and may 10 n into one large bald area with hair around the edges The cause is not known but it as probably hered tary Com mon baldness occurs more frequently in men than in women. It a also more frequently found in peor e with wavy hair than with straight or woolly hair No successful treatment for common baldness is known.

Dandruff which is loose scales

of dead cells and dried o I secreted by glands is a nor mal physical process Some people have more dan druff than others The best treatment cons ats of massage brusting the hair to remove dandruff and

frequent shampoos

Other types of baldness show a rather sudden loss of hair in patches or over the whole lead. These types may result from h gh fevers glandular d sturb ances or emotional experiences. Usually the har regro vs without treatment when health is restored The relationsh p between seborrhea which is an excess sive secretion of sebum (o !) by the sebaceous glands and baldness is not certain beborrhea is not lun ted to the scale It may occur any place on the hody

Economic Uses of Hair The hair of many an male is of economic importance Cloth is made from the hair of the sheep goat camel vicuna and other animals. Felt for hats is made from the hair of rabb ts and hares Cow hair obtained usu ually when the animal is killed for foo i is used in mak mg mortar and for certain course cloths. The hair of horses, tails and manes is made into fishing and horses ha r cloth used for upholstery or stiffen ng garments Hair from camels badgers and sable is used in artists brushes Pg bristles are made into many kinds of brushes including toothbrust is Human har is used for wags and for har nets Artificial fibers such as nylon are now being used in place of animal hair



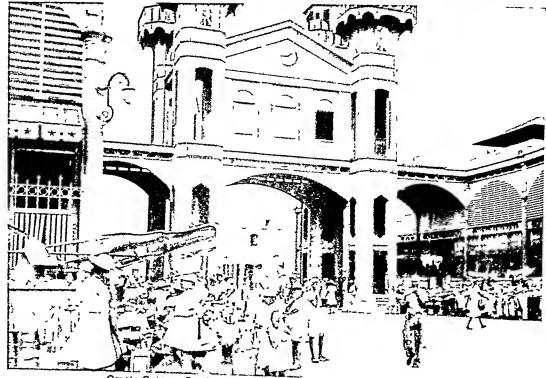
here relarged p cturet you can see the difference between animal hair and such fibers which can be worsen into amouth soit checks. Wood (3) is typical of a hear with the control of the c

Each eyelash lasts about 150 days other hair may last up to four years Most animals have shedding periods when the r hair is replaced by new

Each hair growe from a tubular foll cle or sheath m the skin called a root. A blood vessel feeds it and carries away the waste. Glands provide o ! to keep it moist and soft. Nerves control the blood vessel and a muscle the hair erector By con tracting the muscle makes the hair bristle or at and on end I ke the hair on the tail of an angry or frightened cat

Each hair is a strong fletible elastic thread com posed of many horny cells. Some hars are straight others wavy and still others frizzy or woolly (For illustration in color of a cross section of skin showing hair root see Microscope) Microscopic examination of the cut end of a straight hair shows that it is round while a curly hair is elliptical in cross sect on Scientists have used these differences in human ha r as a basis for classifying mankind into the straight-haired the wavy ha red and the woolly haired races Straight-haired people include the Mongolo dy such as the Chinese and other yellow skinned people and the North American Indians the wavy haired group is the white or Cauessian race and the woolly haired peoples are the Negroes The color of hair is due to a pigment in the cells This is lacking in white hair. The hair of the airs ght-

## HAITI-America's Only NEGRO REPUBLIC



Ornate Gateway Leads to City Market in Port au Prince, Haiti's Capital

HAITI (hā'tī), REPUBLIC OF. Late in the year 1803 the remnant of a French army which had been crushed by a desperate force of Haitian Negroes sailed silently away from Cap Haītien. The rule of France over Haiti was broken, and at last that beautiful land belonged to the Negroes who had been brought in as slaves by the French to work on its rich plantations. But these people, poor and uneducated, were ill-fitted for self-government. For more than a century revolution followed revolution, until in 1915 the struggling nation—one of the two Negro republics in the world—became a ward of the United States.

This land of vivid beauty and tragic history occupies the western third of Hispaniola, the rugged island that lies between Cuba and Puerto Rico, about 20° north of the equator. The rest of Hispaniola is occupied by the Dominican Republic (see Dominican Republic). Haiti thrusts up from the sea like a many-towered citadel. Mountains cover two-thirds of its area, which is about that of Vermont. Green and white coral reefs color the sparkling bays.

The mountains, many of them towering more than 7,000 feet, and the trade winds cause the amount of rainfall to vary greatly in different regions. Some regions, notably the central plain, are semiarid, but many of the valleys and alluvial plains are so well watered and fertile that Haiti has been called "the black man's paradise." In the rainy season heavy

storms on the mountains flood the many short rivers, of which the most important is the Artibonite. The climate is tropical in the lowlands, but in the high mountains the winter temperature sometimes falls below 50 degrees. Haiti has no large animals, but pelicans, flamingos, egrets, and partridge are numerous, and the rivers and bays abound in crabs, oysters, and brilliant-colored tropical fishes.

Haiti's People and Industries

Except for a relatively small number of mulatioes, who control the government, the native population is pure Negro—descendants of African slaves. Illiteracy and the fatalism that numbs a people after long oppression have kept them in an almost primitive state While revolutions fore the country, they raised scarcely more than was needed for their own use and there was little trade. Even today, though agriculture is encouraged and roads are being built to promote trade between towns, the peasants remain small farmers.

Since little effort has been made to irrigate the drier regions, the peasants are crowded into the valleys and alluvial plains, in some places with more than 300 persons to the square mile. Many own their tiny plots of land, others rent from the state. Their homes are squat mud huts with palm-thatched roofs. With machetes and axes, they cultivate their little food crops of sugar cane, corn, beans, and manioc root for cassava flour. Abundant fruit trees—including the

bansna coconut orange avocado mango and bread fruit-thrive with little care in the fertile soil

The Hartians are a picturesque people fond of bright color and music and dancing. The chief reli gon is the Roman Catholic but many upland peasants still practise African voodooism Although Har tis official language is I'rench the peasants speak a

Creole pato s Education is free through all the grades For many years Haits exported only logo ood and coffee which grows wild on the mounta n dones With the establishment of law and or

der however sugar cotton and sisal plantations have been en couraged These products with pineapples and bananas are now valuable exports Coffee how ever is still far in the lead with France as the chief customer Mineral development has been negligible although small depos to of uon and copper have been found with traces of gold silver lead and rine Some salt is et ported Haiti a once thick forests of logwood cedar and other valu

able tumber are largely depleted The chief esties are Port au Prince the capital and Aux Cayes and Cap Hait en Port au Prince built on the fertile alluvial plain Harts was their word for mountainous Columbus named the island La Isla Española ' which later became latinized to Hispaniola Little Spain tablished a Spanish settlement La Navidad (The Nativity) near the present town of Cap Halties and Hasts thus became the first part of the New World to be colonized by Europeans Forced by the Span sards to oppressive labor the Indian populat on soon penshed (see Las Casas) In 1510 the Spaniards began importing African slaves. In 1697 Spain was

OLD AND MODERN WAYS LIVE SIDE BY SIDE





known as the Cul de Sae faces one of the most beau tiful bays in the world-an arm of the great Gulf of Gonaives which deeply indents Haits on the west Aux Cayes hes on the southern coast and Cap Ha tien on the northern coast

#### Hairi a Bitter History

The island has had a turbulent hatory ever since its discovery by Columbus to 1492 It was then in habited by Aranak Indians who called it Quequeya

wick) the western or Hait an part of the island to the French who developed vast sugar plan tations and made Haitz their richest colony

After many futile insurrectons the Negroes un ted in 1798 under Toussant L Ouver ture a freed slave Toussaint captured by trickery died in a French prison but his suocessor Jean Jacques Dessa-lines The Tiger drove out the French late in 1803 In 1904 Destal nes proclamed the rolony a independence and massacred almost all the remaining white inhabitants The great plantations sugar

mills provation works and roads fell into runs In 1866 Desahines was assassinated His general us chief Hears Christophe succeeded him Declamp honself emperor Chr stophe attempted to reconstruct the raveged country Rics ornate nal are of Sans Source near Cap Hartren and his vast estadel though now in ruins, are marvels of massive masoury After Christophe's suicide a succession of aulitary despots seried power

By 1915 revolutions and banditry had reduced Haiti to a miserable condition, and it was in debt to European interests. The United States, under its Monroe Doctrine, felt obliged to intervene and administer the finances under a treaty with Haiti.

Roads, bridges, public buildings, and hospitals were built. The city streets were paved, and sanitary laws enforced. Lighthouses were improved, and a coast guard and well-trained police force were organized. Rural clinics brought medical care to the disease-ridden peasants. Haitians were trained as doctors, nurses, and executives.

Despite improved conditions, the people resented American occupation. In 1930 the first elections in 12 years brought in a solidly anti-American Parliament. The occupation force was withdrawn in 1934. In 1937 a border dispute with the Dominican Republic cost many Haitian lives. Area, 10,200 square miles; population (1950 census), 3,111,973.

HAKE. Fish of the hake family (Merlucciidae) are found in many parts of the world. They have two back fins, the second much longer than the first. The long ventral fin seems to serve as a feeler as the fish moves over the sea bottom in search of food. Hakes are reddish or olive-brown above, white or yellowish below and on the sides of the head.

White hake (*Urophycis tenuis*) is one of the most important food fishes landed in the New England states. It is 16 to 18 inches long and weighs 5 to 8 pounds and a maximum of 30 pounds. Red, or squirrel, hake (*Urophycis chuss*) is used chiefly for oil

and fish meal. It is smaller, averaging 2 to 5 pounds Closely related are whiting, or silver hake (Merluccius bilinearis), of the Atlantic coast and Pacific hake (Merluccius productus) of the West coast.

HAKLUYT, RICHARD (1552?-1616). In the days when England was first winning glory at sea, Richard Hakluyt began setting down the record of his country's achievements. This quiet-living clergyman spent much of his lifetime, during the latter years of Queen Elizabeth I and the reign of James I, gathering accounts of the great voyages of the time. The result gave history an immensely rich mine of information about the stirring deeds in this great age of discovery.

Richard Hakluyt was born in London about 1552 He attended school in Westminster. His cousin introduced him to "certain bookes of cosmographie" and "an universall map." Thereupon young Hakluyt determined to become a student of geography. In 1570 he entered Oxford University. There he began collecting books and manuscripts dealing with explorations and voyages to distant places. He read everything he could find in Greek, Latin, Italian, Spanish, Portuguese, French, and English. After completing his studies at Oxford he remained there for several years to lecture on geography.

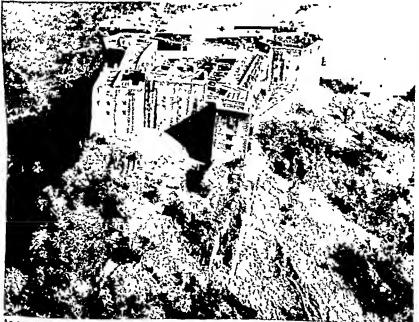
Like many university graduates of his day, Halluyt became a clergyman and received an income from the church. His first book, 'Divers Voyages touching the Discoverie of America', published in 1532, brought him to the attention of the Queen's court He was introduced to sea captains, merchants, and

mariners who gave him first-hand accounts of English voyages.

In 1583 he became chaplain to the English ambassador at Paris. During the next five years he collected information about Spanish, Portuguese, and French explorations. In 1584 he wrote 'A particular Discourse concerning Western Discoveries'. The book contained an urgent appeal to Englishmen to establish colonies in America.

Upon his return to England, he published his chief work, "The Principall Navigations, Voiages and Discoveries of the English Nation" (1589), later revised and enlarged. Hakluyt was promoter of the Virginia Company of London which began the settlement of Virginia.

RUINS OF THE MASSIVE CITADEL OF CHRISTOPHE



As a gesture of defiance to the French the Negro leader Henri Christophe built this huge fortress on the almost inaccessible summit of Bishop's Bonnet Mountain. All the building material and heavy cannon were hauled to the top by hand. The fortress had barracks for 10,000 troops.

"[ALE EDWARD EVERETT (1872 1909) His interest 'n good causes influenced almost all the writings #I Edward Everett Hale His best-known story The I fan Rithout a Country published in the Atlantic fonthly during the Civil War was written to build and Hale a just and true national sentment - he story s hero Philip Nolan has come to symbol -te a man who learns too late to love his country

4. Hale was born April 3 1899 in Boston Hafather ras Nathan Hale nephew of the Revolutionary War ero of the same name The father was ed tor of the Joston Daily Advertiser Edward a mother was Small . verett Hale sister of Edward Everett orator clergs nap and diplomat. She was lerself a unter

. Hale was thus reared in an atmosphere of intellecual activity He attended Bostor Lat n School and intered Harvard College when he was only 13 years old During his student days he reported meetings of he Massachusetts legislature for his father's paper

After his graduat on from Harvard in 1839 Hale aught at the Boston Lat n School while he studied or the Unitarian ministry. He began to preach beore h s ordination (1846) as min ster of the Church of Unity in Worcester Mass where he remained ten years. His only other pastorate was of the South Congregational Church in Boston He was marred

in 1852 he had one daughter and seven sons Hale s interest in bettering soc al conditions led him to take an active part in making Kansas a free state During the Civil War ha was a leader of the Samtary Commission an organization that served much as does the Red Cross today Over the years he wrote for several magazines and edited a religious journal Of all his books he thought In Ha Name (1873) his best but his New England Boyhood (1893) was more popular Among his best-known works are James Russell Lowell and His Friends (1899) and

Viemories of a Hundred Years (2 vols 1902) In 1894 Hale feeling his self too old for parish work resigned his pastorate From 1903 until I is death in Boston June 10 1909 he served as chaplain

of the Umted States Senate HALE NATHAN (1755-1776) During the American Revolut on when taken by the Brit shan I condemned to hang as a spy Nathan Hale sa d I only regret I

H > words have but one life to lose for my country symbolize the spirit of patrict sin to all Americans Nathan Hale was one of 12 children mue boys and three girls He was born on a farm at Coventry Conn June 6 1755 His father Richard Hale was a pros perous farmer and church deacon When not busy

with chores or study Nathan liked to fish wrestle and swim II s study under a village minister prepared him to enter Yale College when he was 14 years old There he studied hard played football jo ned a literary fraternity and engaged in political discussons One of the plays he probably read at Yale was Addison's Cato His last words paraphrased a speech made by a character in that play

After his graduation in 1773 Nathan taught school at East Haddam Conn In the spring of 1774 he be-

gan teach ng at New London Conn He was admired for ha learning his athletic prowess and for main taming school discipline without being severe

When news of the British American clash at Lexmgton Mass arrived at New London the tall heht harred blue-eyed teacher made a stirring speech urg ing enlistment in the patriot arms On July 1 1 78 he was commissioned a first heutenant

He first served at the siege of the But sh in Bus ton On Jan 1 1776 he was promoted to captain When the British evacuated Boston Washington moved his army to New York City After his defeat m the battle of Long Island Washington needed to

know the d sposition of the Briti h forces Capta n Nathan Hale volunteered to spy them out Dressed in civilian clothes he crossed to Long Island from Norwalk Conn As he secured the needed information the British landed in New York C ty and

drove Washington's army to Harlem On the night of September 21 as Nathan Hale tried to regain the American lines he was captured

Taken before General Howe and faced with the notes and maps he had concealed on his person. Natl an Hale admitted his rank and purpose. Howe ordered his execution. The next morning while awaiting sum. monato the gallowa Hale was invited by Br tish Capt John Montresor to spend his remaining time in the capta no tent. Hale accepted and while there wrote two letters they were probably later destroyed by the But sh Nathan Hale mounted the gallows at eleven o clock Sept 22 1778 uttered his famous



rials to the Revolutionary War hero is It was e ected in 6 status by Frederick MacMonnies. It was a cated in C ty Hai Park New York City. A copy of the status stands in Chicago

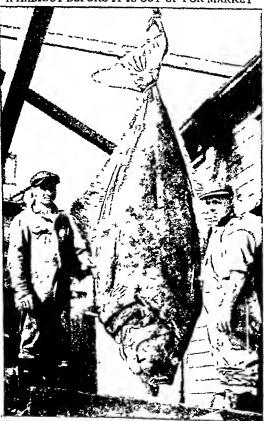
words, and was hanged. News of his death and of his last words were given American officers by Captain Montresor under a flag of truce. (See also Revolution, American.)

HALIBUT. One of the commonest fish on the menu is the halibut. Yet it is probable that many persons who eat a halibut steak have no idea of the great size of the fish, for a whole halibut is scldom displayed in the market. Halibut caught for market are commonly from 3 to 5 feet long and weigh from 30 to 100 pounds. Some weigh 200 or 300 pounds, and specimens more than 9 feet long and weighing more than 600 pounds have been caught. The female is larger than the male, which rarely weighs more than 60 pounds.

The halibut is the giant of the flatfish family (see Flatfish). It differs slightly in shape from its relatives the flounder, sole, and turbot in having a thicker and more elongated body. It lives in the cold waters of the Pacific and Atlantic on banks extending from shore to a depth of about 1,500 feet. Its southern limit in the Pacific is San Francisco, and in the Atlantic, New York City and Havre, France.

In one season, a large female lays more than a million eggs, each about one eighth of an inch in

A HALIBUT BEFORE IT IS CUT UP FOR MARKET



This 325-pound halibut was landed at Seattle, Wash., by the halibut schooner 'Yakutat'. Halibut are caught with hooks attached to long lines at intervals of about 13 feet.

diameter. The larva swims upright and has an eye on each side of the head. Soon, however, the young fish swims on its left side, and the left eye migrates to the right side of the head, where both eyes remain, leaving the left side blind. The right side of the adult is brown, and the left side is pale, almost colorless. The halibut sometimes buries itself in sand to hide from its enemies, the shark and the seal, or to he in wait for prey. It feeds on mollusks and crustaceans, crunching them with strong teeth set in powerful jaws. It also eats skate, cod, menhaden, and mackerel. With a flip of its tail, it can stun a large codfish, which it then devours.

In addition to the importance of halbut as food, oil, rich in vitamins A and D, is extracted from its liver and viscera. The world's most important halbut fishery extends 2,000 miles along the Pacific coast of North America, from northern California to the Bering Sea. These fishing waters are notable for conservation of a natural resource through vise management. They are regulated by the United States and Canada through the International Fisheries Commission. Halibut are also caught in Japanese waters and in the Atlantic off the coast of Canada and northern United States. The catch near Iceland, Greenland, and Norway is also important.

The scientific name of the common halibut is Hippoglossus hippoglossus; of the arrow-toothed halibut, Atheresthes stomias; of the Greenland halibut, Rheinhardtius hippoglossoides. The arrow-toothed halibut ranges in the Pacific from San Francisco to Alaska; the Greenland halibut, from the Arctic parts of the Atlantic south to Finland and Grand Banks.

HALIFAX, Nova Scotta. Rudyard Kipling gave the name "Warden of the North" to Halifax, capital of Nova Scotia, because it is the most strongly fortified position and the chief naval station of the British Commonwealth in North America. It has held this position almost from its founding in 1749.

When the British troops were driven out of Boston in 1776, they sailed to Halifax to reorganize. In the War of 1812 it was the base of operations for British privateers, and in the American Civil War it was an important base for Confederate blockade runners Many United States and Canadian troops sailed from Halifax during the first World War. In 1917, after a collision in the harbor, a munitions ship exploded, killing more than 2,000 people and razing the city's north side. Throughout the second World War it was one of the chief bases for scnding supplies from Canada to England. To protect the convoys from enemy submarines, a steel net was installed in the harbor.

One reason why Halifax is so important is that it is 600 miles, or about a day's travel, nearer Liverpool than New York City is. It is also nearer to some South American and South African ports than are several other northern ports of North America.

Its favorable position and its magnificent harbor, open the year around, make Halifax a great commercial center. To improve the shipping facilities, the

Canadian government has spent \$30 000 000 and has built huge terminals where transcontinental trains can run alongside the great Atlantic liners

Manufactures of importance have also grown up Raw sugar brought in from the West Indies is refined in the lurgest refinely in Canada There is a large oil re finery and foundries and machine shops make and repair equipment used by the great transportation companies Populat on (1951 cen sus) 85 559

HALL, CHARLES MARTIN (1863-1914) On the moining of Feb 23, 1886 a young man of 22 stool anxiously over a compli cated mass of electric wires oru cibles and heating apparatus in a

woodshed in Oberlin Ohio For two lours Charles Vartin Hall watched as the contents of one of the cru cibles grew hotter and hotter Finally he turned off the powerful current and shaking with excitement poured out the molten mass. A number of i ttle silver

colored drops had separated and they quickly hardened into shining buttons of metal

Catching up the globules Hall ran to the near by cam pus of Oberlin College Bursting into the office of his friend and adviser Prof P F Jewett he cried 'Professor I ve got it!

This moident was the foun dation of one of our great est modern industries for Hall had discovered a cheap process of separating alum mum from its oxide Pure \*luminum oxide was abun dant and cheap To melt it by electrolys s required a tem perature of 2 050° C Hall s problem was to find a substance which melts at a low er temperature and when melted dissolves aluminum oude He found his solvent in cryolite (see Aluminum) Hall a Early Life

Charles Martin Hall was born at Thompson Ohio Dec 6 1863 His father was a Congregational minister who later took his family to Oberlin to live Charles sabsorbing interest in chemistry began when he found an oll



His d scavery at a cheap process for making alam num a like bee a of a grant and unity

NAMES IN THE HALL OF FAME CHOSEN IN 1988 George Washington Henry Cley Nothensel Hewiborne Abraham Lincoln

George Pesbody Rahert E Lee Daniel Wabster Benuttin Franklin U yatse # Grant Peter Cooper ohn Marahali Ibamas Jafferson Laich Waldo Emers Et Whitney ha James Audubon Horaco Mana Henry Wadsworth Lour Henry Ward Beeche fames Kvat fellow oseph Story Robert Pulton the Adams Washington Irv og Waltern Hilery Chann ag onethen Edwards amuel F B Morse Gilbert Shoort

Ask Gray Day 4 Gleegew Farragut NAMES SUBSEQUENTLY ADDED James Russell Lowell Rufus Choate hp Greenleal Whiti er Daniel Brown Samuel L. Clamens John Owney Adams Angustus Saut Caudens lamas Madison mes Buchauen Esde Alexander Herm ton Waltan T Shermad Patrick Heavy William T G Morton Louis Agest z Maria M tckell Emma Willard Roger Welliams A ce Freeman Patates Liture Boath John Paul Jones Welt Wh tmen Harnet Brecher Stown O mer Wendell Holmes Edgar Allem Poe James Mograt amer McHeill Whistler Januar Feminore Cooper Phill pe Brooks mon Newcomb Walters Cullen Bryant William Penn Frances E Willard grances & windered Andrew Jackson George Bancrick John Lothrop Molley

Mary Lyon

Matthew Festane M.

Croser Cleveland

Franc a Parkingu

Joseph Hanry Charlotte Cuthman

Mark Hopksen

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Stephen Foater Booker T Westungted Thomas Pense Watter Reed Sanney Lan er William C Gorges Woodrow Wileon South R Apthony Atexander Grabam Bell

book on the subject in his father a bbrary Even before he entered college soung Hall was interested in the extraction of aluminum and set hunself to find a process which would be commercially profitable At college he conducted expen ments to this end and eight months after graduation he made his epochal discovery

The date is important for in April of the same year a young Frenchman Paul Louis Toussaint Héroult was granted a French patent for the same process Hall applied to the United States Patent Office m July 1886 for a patent on his discovery but it was not granted until 1889

Meanwhile Hall had all the difficulties usually encountered

by inventors Manufacturers at first were not inter ested. When at length the Mellon interests gave him. financial backing and successful manufacture was un der way another manufacturer brought a law suit secusing Haff of having stolen the Héroult process But

he was cleared of the charge in 1893 and then made a fortune from his invention The sucress of the Hall Héroult process has made the cost of a pound of aluminum s matter of cents instead of dollars so that we have katchen pots and psus and hun dreds of other common arti-

cles made of this metal HALL OF FAME On Uni versity Heights in New York City overlooking the Hudson and Harlem river valleys stands the Hall of Fame for Great Americans It is a granite colonnade 630 feet long which follows the curve of the terrace on which rest several of the buildings of New York University In the colonnade are panels for 100 bronze tablets each to bear the name of the person commemorated the dates of his buth and death and an appropriate inscription Dr Henry M MacCracken, a for mer chancellor of the university, originated the idea of the Hall of Fame According to conditions made in 1900 by

Helen Gould Shepard who

gave funds for the memo-

rial to the American people, only persons who had been dead 10 years or more were eligible to be so honored. In 1922 it was decided to extend to 25 years the minimum time that must elapse after death.

Fifty names were to be inscribed in 1900, but from

more than 1,000 nominations, only 29 were elected. Five names were to be added every fifth year thereafter until all the panels have been filled. A later ruling provided that if five names are not selected at an election, up to seven names may be chosen at the next election. All names in the Hall of Fame are listed on the preceding page.

The public makes nominations to the senate of New York University. Names seconded by the senate and those who received 20 or more votes in a previous election are submitted

to approximately 100 electors, who vote upon them subject to senate approval. Sixteen classes of citizenare recommended for consideration, including statesmen, authors, artists, scientists, educators, physicians, businessmen, inventors, explorers, philanthropists, and others. Foreign-born Americans have been eligible since 1914. Also in 1914, a colonnade site was set apart as a Hall of Fame for Women, but in 1922, after seven names had been chosen, it was decided to include the names of the women with those of the meu. HALLOWE'EN. Customs and superstitions gathered through the ages go into our eelebration of Hallowe'en, or "Holy Eve," on October 31. The day is so named because it is the eve of the festival of All Saints, but many of the beliefs and observances connected with it arose long before the Christian era, in the autumn festivals of pagan peoples.

The ancient Druids had a three-day celebration at the beginning of November. On the eve before, they believed, spirits of the dead roamed abroad, and they lighted bonfires to drive them away. In ancient Rome the festival of Pomona, goddess of fruits and gardens, occurred at about this time of year. It was an occasion of rejoicing associated with the harvest; and nuts and apples, as symbols of the winter store of fruit, were roasted before huge bonfires.

Even after November 1 became a Christian least day, honoring all saints, the peasants clung to the old

process of the state of the sta

pagan beliefs and customs that had customs that had grown up about Hallowe'en. It became a night of mystery and fun-making, with many picturesque superstitions. Folk came to believe that they could foretell the future on that night by per-

forming such rites as jumping over lighted candles. In the British Isles great bonfires blazed and laughing bands of "guisers," young people disguised in gro-

tesque masks and carrying lanterns carved from turnips, gathered in each village. Their rollicking fun and cherished superstitions are described in Robert Burns's famous poem Hallowe'en'.

Our Hallowe'en celebrations today keep many of these early customs unchanged. Young and old still gather to hunt nute and to duck for apples bobbing in a tub of water. Grin-

ning pumpkin jack-o'-lanterns, rustling cornstalks, and white-sheeted figures create an air of mystery, and black paper witches and cats are used for party decorations.

Hallowe'en is a favorite "special day" for school celebrations, when young people hold costume parties, play old-fashioned games, and give elever plays and pageants based on the ancient customs. Frequently whole communities gather for a Hallowe'en festival, as did the villagers

of earlier days.

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HALS (hāls), Frans (1580?–1666). This Dutch painter, who is now recognized as one of the greatest portrait painters of all time, was almost forgotten and his work was ignored for two centuries after his death. So little was he esteemed that some of his paintings were sold for a few dollars, though lately a single work has brought as much as \$350,000. Critics today put him next to Rembrandt at the head of the Dutch school, and some even call him the greatest of all painters for truth of character.



Frans Hals had a checkered life marked by the same bold contrasts of light and shade that are jound in his work. Though of an ancient patracan family the equal of the sturdy Haarlem burghers whose portraits he painted so profusely Hals found the rollicking life of tayers and street more to he taste Singers and jesters pot-girls and tavern herocothese were his favorite subjects and he set them down on canvas with such an unquenchable humor and you of hying and so masterly a hand that no one can look at them a thout a responsive smile. But the painter's love of tavern life reduced him to nen irv and near the close of his long life we find h m so poor that he had to apply to the municipal ty for alms

Born in Antwerp Hals moved to Haarlem in 1101 land when he was a young man. In 1616 he began the first of the great series of shooting guild groups and public officials that show his genius porticularly well In the Town Hall of Haarlem 84 ladies and gentlemen look down from the walls in eight great canvases. The last of the series was punted in 1661. when Hals was 81. There on the walls may be traced the artist a development. The picture painted in

tion others say that bright colors were so expensive that he had to use the cheaper black and white after by days of plenty nere over

Many other examples of Hals a work are scattered throughout the world in public and private galleries The Fool a copy of which hangs in the Risks museum in Amsterdam is considered by many to be the best character portrait ever painted 'Hille Bobbe an old woman with a half witted grin may be seen in the Royal Museum in Berlin. His bestknown work is The Laughing Cavalier in the Wallace Collection in London The original owner paid \$400 for it Sir Richard Wallace paid \$10 200 for it in 1865 and since then its value has increased greatly HAMBURG GERMANY Located 75 m les inland from the North Sea on the Elbe River Hamburg has long been Germany s greatest harbor city. It is situated so that it can serve the largest ocean liners and also send cargoes to the intenor on barges. The harbor was made by damming the Alster River a small tribu tary of the Eibe The old part of the city is a network of waterways which act as river roads between the warehouses and the man stream. These canals

#### THE GREATEST OF GERMANY S SEAPORTS



and vides the Aleler late live lakes. B ance (it or, but this computage to lad lo fool Al lad p ance of it as we I so much of the curround og c ty the real harber merc lessly and destroyed m

1633 shows him at his most vigorous period when his brillant color and quick grasp of feet og expression were at their he ght. The later groups are pa nted with great skill but the coloning has been toned down to somber gray tints Does the grayness of these last pictures reflect the sadness of the poverty-stricken painter a declining years? Some hold to this explanagave Hamburg the appearance of a commercial Venuce, with sooty turboats and barges replacing the picturesque gondolas (see Elbe River)

Hamburg was founded by Charlemagne who built a fortress there in 808 for protection against the Slavs In \$11 be founded a church on the Elbe which was the beginning of the Christianization of northern Europe

Despite repeated pillaging and burning by the savage Danes and Slavs, the early Christians resolutely rehuilt the town and the church many times. It was made the seat of an archhishop in 834, and from then on it became the center of civilization in that part of the continent.

#### Its Troubled Years of Growth

The grant of fishing rights on the Elbe, and other franchises from Frederick I in the 12th century, started Hamburg's commercial life. Early in the 13th century, Lübeck and Hamburg formed the Hanseatic League and other towns soon joined the federation. In a short time, it had grown powerful enough to protect its land and sea trade from pirates and marauders (see Hanseatic League). In 1510 Hamburg was proclaimed a free imperial city by Maximilian I.

With these advantages, local and coastwise commerce flourished, and many Dutch and French refugee merchants were attracted there to share the city's prosperity. But ocean trade was jealously guarded by Spain, France, and England, and Hamburg was forced to take a minor part until avenues of commerce were opened up in the new world.

After Napoleon's victory in the battle of Lübeck in 1810, Hamburg was occupied by the French, and heavy taxation and looting ruined its trade. During the occupation years of 1813 and 1814, under the tyrannical rule of Gen. Louis Davout, its population shrank from 100,000 to 55,000.

In the years following, the city was rebuilt and commerce was revived, but it was again interrupted in 1842 by a fire which destroyed about one-third of the business section. Sanitary conditions were greatly improved in the rebuilding of the burned areas. The remains of the old ramparts along the shore of the Binnen Alster, the smaller of the city's two lakes, were beautifully landscaped, and the gay gardens and handsome buildings stood out sharply against the grime of the lower city.

With the advantage of a harbor that was ice-free the year round, and the finest of modern equipment, the port now grew to the peak of its importance. Its exports and imports were vast in variety and quantity, and the harbor was constantly teeming with activity. Among the city's many industries were shipbuilding, sugar refining, and the manufacture of chemicals, furniture, and flour. Railway systems ran into Hamburg from all sections of central Europe. Before the second World War, it had also become one of the centers of Europe's air traffic. Here too were established plants for refining oil and for building warplanes and submarines.

Destroyed by Air Raids, but Rebuilds

During the second World War the giant industrial city became one of the chief targets for Allied air raids. Mass bombings destroyed three fourths of the city, leaving it one of the most desolate in Europe. The population fell to less than half.

By 1952, however, Hamhurg was making one of the swiftest recoveries among German cities. New factorics arose in the shattered industrial districts. Make-

shift bunkers and huts built of rubble were giving way to modern houses and apartment buildings. Ships of all nations again steamed into the rebuilt harbor. The refitted sbipyards, the heart of Hamburg's great ocean commerce, clanged with work. In population. Hamburg had regained its prewar size. Population (1950 census), 1,605,606.

HAMILTON, ALEXANDER (1757-1804). Of all the men who aided in founding the republic of the United States and in framing and setting up the government under the Constitution, the most brilliant was Alexander Hamilton. In spite of his youth (he was not yet 20 when the war hegan) he was one of Washington's most trusted aides in the Revolution. As a larver he ranked among the foremost of his time. In the critical period of 1783-89 he won recognition as one of the soundest political thinkers of the day. In setting up the new federal government he had the chief part in translating the provisions of the Constitution into a strong, national governing system. It is not too much to call him one of the greatest statemen in United States history.

Hamilton's history was as unusual as the man himself. Born in the island of Nevis, in the British West Indies, he inherited from his well-born Scottish father shrewdness and a logical mind, while from his gentle Huguenot mother he received the liveliness and charm characteristic of the French. He early diplayed a talent for writing, and his vivid description of a West Indian hurricane, which appeared in one of the local papers, so impressed his friends that they raised money and sent him to America to complete

his education.

His Career in the Army

Hamilton's course at King's College (now Columbia University) in New York City was interrupted by the outhreak of the Revolutionary War. As early as 1774 he had begun to advocate the cause of the colonists, and when the conflict began he entered the army, and was soon made captain. Then for four years (1777–81) he was on Washington's staff with the rank of lieutenant colonel. He took a brilliant part in the field in the campaign which ended with Comwallis' surrender. Washington felt for him the sincerest admiration and affection.

Even during the war Hamilton had seen the need for a strong central government; and during the critical period which followed, when the country was "floundering helplessly in a sea of unpaid debts and broken promises," he advocated the formation of a new constitution to take the place of the weak Articles of Confederation. He persuaded New York to send delegates to the Philadelphia Convention, and was himself chosen as one of the three to represent the state; but the other two were bitter Antifederalists and he was constantly outvoted until they withdrew from the convention. Then Hamilton signed the Constitution for New York. He believed that a limited monarchy like that of Great Britain was the best on earth, and failing that, he would have pre-· ferred a strong aristocratic republic, with the officers chosen for life Nevertheless he exerted all his great powers in support of the Convintation that was formed The opposition in his own state under Gov George Chican was very strong and without New York's ratification the Constitu-

tion could win no real success Hamilton, therefore, with the aysistance of Madison and Jay, wrote a series of newspaper articles in its defense over the signature "The Federalist" Not only did these articles prove the decisive factor m securing New York's ratification, but they had a tremendous influence throughout the country Although written only to serve a particular purpose in his own day they have proved of great permanent value to students or law and political science and are regarded as a classic commentary on the

Constitution
Washington appointed Hamilton
as the first secretary of the treasury, and it was in this office that
he left his strongest impress on the
American government. It was he
who at the outset gave the govern-

ment under the Constitution its leaning toward strength and national unity on which Chief Justice Mershall was later able so effectively to build

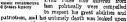
Hamilton's financial measures not merely assured the payment in full of the foreign and domestic debt of the United States but also included the taking over by the United States of the debts contracted by the states as a result of the Revolution This provision he carried through Congress only by a bargain which gave to the South the location of the federal capital on the Potomar But the effect of the measure was not merely to restore the credit of the country, but to bind to the Union every holder of state and national "script" or bunds Other important measures included the establishing of a national bank and the enacting of a tariff which should "protect infant industries ' No American statesman ever had greater tasks to face than had Hamilton, and none was more successful in meeting

In his efforts to strengthen the national government bewas opposed by Jefferson, the secretary of state, who was a firm believer in states' rights in foregan affairs Hamilton favored Lingland and Jefferson leaned toward Revolutionary France. The two became the leaders of the first enganized political became the Linted States—the Red Bartes). Jefferson resigned from office at head Bartes). Jefferson resigned from office at the close of 1798, and Hamilton a year later, but their party antisgonism continued. In the election of 1800 Jefferson's party wept the country, but owing to a targle of the election I has Congress was called upon to decide cleation I have Congress was called upon to decide

whether Jefferson or Aaron Burr should be president Hamilton used his influence to defeat a plan of the less scrupulous Federalists to substitute the vicepresidential candidate for the presidential candidate of their opponents Hamilton

knew that the voters meant Jefferson to be their chief executive, and besides he profoundly distrusted Burr

As a result of Hamilton's persectent opposition to him Burr finally challenged Hamilton to a duel According to the accepted es le of honor in his day, Hamilton could not refuse the challenge On the morning of July 11, 1804, they met at Weehawken a noted dueling ground on the Jersey shore of the Hudson opposite New York City Hamilton did not intend to fire, but his opponent aimed with deadly precision Hamilton fell mortally wounded and died the next day He was generally mourned by his countrymen Even those who differed from han politically were compelled



as a great public calamity

HAMILTON, ONTARIO Its Jostian on an excellent
barbor at the western end of Lake Ontarno, and the
cheap electrical poner obtained from Ningara Falls,
have combined to make Hamilton one of the forement
manufacturing ettes of Cinada. It is the center of
the nation's steel adustry and in addition produces
textiles, farm machinery, electric wire and rabbis,
aircraft automobiles and trucks tires, im plats, and
many other articles. Nextly a bundred American
firms have branches; of the milk of the distributing reader for the rich Ontario fruit districtributing reader for the rich Ontario fruit distric-

The city less at the foot of Mount Hamilton, a contentation of the ridge over which Niagara Falls planges A pask and monument mark the site of the battle of Stoney Creek, an engagement of the War of 1812. Hamilton was founded in 1773 by Unfeel Emission of the Comment of the American Colomes with preferred to creams Bould American Colomes are preferred to creams Bould and the Colomes are preferred to creams Bould and the Colomes are the preferred to creams Bould and the Colomes are the Professional Colomes and the Colomes are the Colomes and the Colomes and the Colomes are the Colomes and the Colomes are the Colomes and the Colomes and the Colomes are the Colomes and the Colomes

University "opination (1951 censis), 205,321

HAMLET By almost inviressal consent this is regarded as Shakespeare's greatest tragedy. The opening of the play reveals Hamlet, the young prince of Denmark, plunged so bitter grief by the suddenth of his propal father, who according to repeat had died of a seepent's sting. The fact that the queen, his mother, has almost munchiately married the dead king'ail-favored brother adds to the prince's sorrow. To hum appears from the tomb the dread spirit of his father, revealing that, "sleeping, by a brother's hand" he had calls brother's hand, "the had center of the contract of the state of the s



statesmen in United States history

upon Hamlet to revenge this "foul and most unnatural murder." Hamlet's brilliant, sensitive mind is thrown into feverish activity by the horror of the deed. He pretends insanity, the better to watch the guilty pair. Distracted between his duty of revenge and his inability to form a plan, he contemplates his own suicide.

"To be or not to be"-he muses bitterly, "that is the question." In a court play he has the actors insert a scene like that of his father's murder, then observes the king's reaction. The king's confusion confirms the ghost's revolation.

By mistake Hamlet kills Lord Polonius, father of Ophelia whom Hamlet loves. She goes insane and drowns herself. Polonius' son, Laertes, swears revenge. The king uses him to carry out his own plan to murder Hamlet. A dueling match is arranged with Hamlet. Laertes, by the king's advice, is to use an untipped foil, poisoned at the point,

while the king will furnish a cup of poisoned drink to quench Hamlet's thirst. In this tragic duel, Hamlet is slain as planned, but Laertes himself is pierced with his own poisoned sword. The queen by mistake takes the fatal drink, and Hamlet in the moment of his death stabs the king.

HAMPDEN, John (1594-1643). "Patriot" Hampden was one of the Puritan statesmen who opposed the autocratic government of Charles I and brought on the English Civil War. He was a man of wealth and position, a cousin to Oliver Cromwell, and one of that leader's ablest advisers.

When Hampden refused to pay the illegal shipmoney tax levied by Charles, he became a popular hero and a central figure in the Puritan Revolution. In the early days of the Long Parliament (1640-60), Hampden was right-hand man to the leader of the Puritan cause, John Pym. He also was one of five members whom King Charles attempted to seize on Jan. 4, 1642. This act led rapidly to war.

When hostilities began, Hampden joined the parliamentary army. He was mortally wounded at Chalgrove Field, June 18, 1643, and died June 24. His capacity as a statesman and as a soldier prompted the historian Macaulay to say that if Hampden had lived he would have been the Washington of England.

HAMSTER. The Syrian golden hamster is a small rodent, related to the rat and mouse. Since the first female and young were discovered in 1930, the hamster has become a popular pet, and it is replacing the guinea pig for experimental use in research.

The full-grown adult is only five or six inches long and weighs about a quarter of a pound. The dense, silky fur is a rich mahogany red on the back. The belly and legs are creamy white. The animal has large, alert ears and a tiny stump of a tail. It has large cheek pouches in which to store food until it can be hidden in its den.

The hamster is ideal for laboratory experimentation because it is more susceptible than the guinea pig to certain human diseases, and it breeds even more rapidly. The entire life cycle may be observed by students in a single school semoster. The female begins to bear young at 59 days. The gestation period

is 16 days. From 2 to 15 young are born every six weeks for a year. Then the animal ceases to reproduce The young are born naked and hlind. The fur appears in two or three days; the eyes open in from 14 to 16 days. The animals stop feeding on the mother's milk at 22 days. The life span is from two to three years.

Hamsters make attractive pets, for they are clean, gentle, healthy, and free of parasites. They live best in a small pen, one to two feet square. The floor of the pen should be covered with any dry, soft, absorbent material, deep enough in one corner to provide a hiding place for food. In na-

ture the animals are grain eaters, but they thrive on any vegetable scraps. They sleep during the day and eat at night. They should be kept in a warm room of about 70 degrees, for they become sluggish and go into hibernation at low temperatures.

Hamsters are native to Europe and western Asia. There are several species. Only the Syrian golden hamster (Cricetus auratus) makes a good pet and labo-

ratory animal, for the others are vicious and bloodthirsty. It was first imported into the United States from Syria in 1938 for laboratory use by the Public Health Service.

HANCOCK, JOHN (1737-1793). The name of this Boston patriot heads the list of those who signed the Declaration of Independence. From this circumstance came the phrase "to give one's John Hancock," meaning to sign one's name.

When Hancock was a child, his father died, and he was adopted by his uncle, the richest merchant in Boston. He inherited the uncle's wealth when he was only 28 years old. In 1768 his sloop, the Liberty, was seized by British authorities for nonpayment of duty. Its cargo of wine had been smuggled ashore. The seizure precipitated a riot on shore. The ship was used by the British as a coast guard vessel until it was burned by a patriot mob at Newport, R. I.

The episode aroused violent popular feeling and was an important prelude to the revolution. Hancock's opposition to British rule was no doubt inspired by business interest, but whatever his motives, he was valuable to the cause. In 1770, after the Boston Massacre, he was one of the committee that went to the governor to demand the removal of British troops from the city. At the funeral of the victims he delivered an address which led to an order for his He was president of the revolutionary Provincial Congress which met at Concord and later at Cambridge, and his arrest was one of the



This little cousin of the rat and mouse stuffs food into its cheek pouches with handlike front paws.

objects of the British expedition to Concord which precipitated the battle of Lexington and Concord and began the Revolutionary War

Hancock was ele ted president of the Second Conta nental Congress in 1775 and held that office two years In 1780 he became the first elected governor of Massa. chusetts, and was annually re-elected with an interval of two years (1785-1787) until his death. The support which he was finally induced to give to the Federal Constitution in 1788 was the decrive factor in the struggle for ratification in Massachusetts and in setting the new plan in operation.

Despite the jealousy and vanity whi h limited his work Hancock was a man of strong common sense and sound patriotism and it meant much to the cause of the colonies to have the support of his wealth social position and education when many of the upper class were Loyalists or Tories as their

enemies called them

HANCOCK WINFIELD SCOTT (1824-1886) Ore of the best all round soldiers an ong the Union officers of the Civil War was Winfield Scott Hancock He received his military training at West Point gradu ating in 1844 and gained experence in the War with Mexico He was a captain when the Civil War broke out and was soon commiss oned brigadier general and helped to organize the Army of the Potomac He did gallant service in the buttles of South Mountain and Antictam (1862) At Fre ler cheburg (December 18: 2) he led his corps in a desperate attack on Maryes Height through a de dly fire from which less than 3 000 of the or gund 5 000 came back At Getty-burg (1863) it was said that his appearance on Cemetery Ridge on the first day of the battle was equal to re nforcement by an army corps Men who were fleeing stopped and the troops were restored General Hancock was in command of the Second

Corps and it was his forces which on the last day of the battle stopped the terrible charge of Pickett s men and deprived the South of all hope of victory During this attack Hancock was seriously wounded but he stayed on the field until the victory was won After he recovered from his wounds he bore an important part in the hard fought battles of the Walder ness Spottsylvania and Cold Harbor in 1864 At Spottsylvania he carried the Confederate works eapturing 3 000 known as the bloody angle prisoners For his notable services Hancock was promoted to the rank of major general in 1866 In 1880 the Democratic party made him their can

didate for the presidency but in the election he was defeated by James A Garfield who in addition to an honorable multary currer had long been a leader in Congress Hancock remained in the army until his death serving his country for over 40 years He was a brave fearless leader and an able commander McClellan called him superb and Grant wrote Hancork stands the most conspicuous figure of all who did not exercise a separate command

HAND Whatever men have done that distinguishes them from the brutes has been done by their brains But the hand has been the instrument of the brain in bringing about almost all of these successes The cultivation of the soil mining building man ifacturmg-sculpture painting literature-what could man have done without his hands? Can you imagine this book to be written printed bound and distributed without bands? Apart from the hand speech is the only important instrument of the brain that distinguishes man from the lower animals

The human hand is indeed a wonderful pere of mechanism Placed at the end of the arm with the ball and so ket joint at the shoulder the lines joint at the elbow and a peculiar point at the wrist the movements of the hand are indeed marvelous

The eight bones of the wrist are called carpal bones the five of the palm are the metacarpals and the 14 in the fingers are the phalanges phalanges are so called because they are arranged in ranks as were the Greek soldiers in the milit ra formation known as the phalany All these bones are bound togetl or by tough flevible lighments.

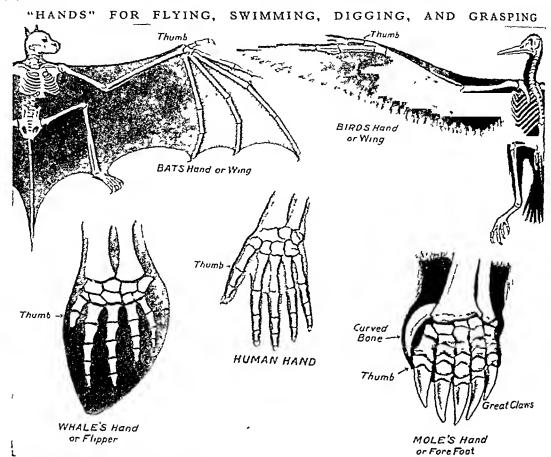
The muscles that move the hand are mostly upon the forearm and have long tendons by which the pull of the muscles is communicated to the different joints You can feel and see some of these tendons in your wrist when you bend your fingers. There are more than 30 pairs of muscles producing hand motions The thumb is arranged so as to work against the fingers in very useful grasping movements. Just make believe that you have no thumb and try to nick up something or to write or to use a fark!

The sensibility of the hand is more highly developed than in most other parts of the body. There are many little elevations or papillae on the ekin of the paim and fine nerve fibers extend from these to the brain Thus the skin is made very sensitive to touch

heat and cold

Because it po-sesses both strength and lightness of touch the hand is wonderfully adaptable to all sorts The flexible fingers can grasp large objects firmly and manupulate delicate machinery while the nails on the taps make it possible to pick up very small things The same hand that wields the hammer may adjust the minute parts of a watch. The I ghtming like rapidity with which trained finger muscles can perform fremendously complicated tasks such as the fingering of violin strings by a Kreisler or the rippling of mano keys by a Paderewski must always seem a muracle to the ordinary man

While the human hand is the most completely developed in the animal kingdom for all round purposes of protection strength blows grasp ng del cate movements and sensitiveness it is interesting to note that the fore hash of all mammals is formed on the same general plan The horse a front hoof is just a randified finger pail all the fingers but one have disappeared or are represented only by the remnants called aphata In these animals the modifications



While the human hand is the most perfect instrument of all, other creatures also have "hands" adapted to various purposes. The fingers of the hat, as you can see, have grown very long to support his wings, the "thumb" remaining free to be used as a cluster hook. The hird's "hand" has lost almost all its fingers, stiff feathers taking their place. The whale's hand is broad and short, but all the fingers are plainly represented. The mole not only has the usual five digits, but also an extra bone to make his digging pill even broader, and his "fingernails" have developed into huge claws.

are for purposes of speed in running. In the bat, very long fingers are developed to support the web which, instead of feathers, constitutes the "wing" in those flying mammals. The beaver's hand has a still different form, adapted to its mode of life. The mole has a broad shovel-shaped hand. Even the whale has a fore limb which has the modified structure of a hand. HANDBALL. A game in which a ball is hit with the hand against the walls of a court began in Ireland about a thousand years ago. For hundreds of years, this game called handball was little played except in Ireland. Then, in the 1880's, the Irish brought it to the United States. On the first handball courts built in Brooklyn, N. Y., the game was shown to be so fast and lively that athletes the nation over wanted to try it. Today most of the large gymnasiums have handball courts, where men regularly test their skill, speed, and endurance.

Handball is played either on a four-wall court or a one-wall court. Four-wall handball is the game

which originated in Ireland. One-uall handball, to be described later in this article, was developed in New York City about 1900 from the four-wall game.

The diagram on the next page shows the arrangement of a standard four-wall court. The back wall is lower than the other walls, and above it is a galler, where the referee and the scorer are stationed and

from which spectators may watch the game.

A black rubber ball is used, 1½ inches in diameter and 2½ ounces in weight. Though soft, it can sting the bare hands on its lively rebound from the walls. Hence many players wear special gloves in addition to the usual track suit, wool socks, and heavy-soled tennis shoes.

Two, three, or four persons may play. When two play, one is the server; the other, the receiver. When three play, the server is opposed by two receiver. When four play (doubles), the server and his partner form the serving side; their opponents, the receiving

siderable skill is re-

ade The ball may be struck with either hand but not kicked

In serving the server must stand in the service zone between the short line and the service line He must drop the ball to the floor within the service zone and then strike the ball on the bounce so that it hits the front wall first and on the rebound lands on the floor be hand the short line A

served ball landing in front of this line is a

short Two shorts in a row score an out against the server He then becomes the receiver and his opponent becomes the server in doubles the server's partner must stand in the screece box with his back to the wall until the ball passes the service line

The receiver must stand behind the short line while the ball is being served. He must play the serve e ther on the fly or the first bounce so that the ball returns to the front wall without hitting the floor Then the server hate the ball on its rebound from the wall and play continues with the opponents alternately butting the ball until one of them fails to return it legally to the front wall

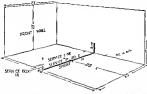
If the server fails to make the return an out is scored against him and he then becomes the receiver If the receiver fails to make the return a point is awarded the server who continues to serve until be is out. Thus only the server or the serving side

scores points A game is 21 points a match the best two out of three 2ames

The rules permit a served ball after butting the front wall to strike one side wall before landing behind the short line A returned ball as permitted to strike the side walls and ceiling before hitting the front wall From there the half may bound clear to the back of the court and may be played from the back wall The ightning speed with which the ball bounces about the court makes the game very interesting to watch

One Wall Handball

court having a wall 20 feet wide and 16 feet high The court is 20 feet wide and 34 feet long. The same ball and the same system of scoring are used as for four wall handball Two or four persons may play In a fast game con



emagte of a handba I court and for clarity their the walls end flour. The colling a not shown. The butte on the

quired to keep the ball within bounds since the court is open on three sides. The onewall court permits the game to be watched by more spectators than the four wall court and it costs less to build The wall is often built long enough so that sev eral courts can be laid out on both sides of it This makes the onewall game popular at playgrounds as well as in gymnasiums

HAN'DEL GEORGE FREDERICK (1685-1759) The name Handel suggests Christmas and the Messish', with its glorious Hailelujah Chorus This oratorio of his has for so many years been given in connection with the holiday festivities that it has come to be a tradition of the season

Although Handel was born a German he won his first great fame in Italy with his Italian operas. He later became an English citizen and is today chiefly remembered for his English oratorios

The father of Handel a German doctor of Halle was much opposed to his son a musical ambitions But the boy was obsessed with a desire to learn to play the clayschord (an ancestor of the plane) and at the age of eight years had taught himself. When an opnortun ty was presented for him to play the organ in the castle of a ne ghhoring duke he d d it so skill fully that the duke persuaded the lad a father to give

his son a mus cal education. The boy at once became a pupil of the organist of the Halle Cathedral

At the age of 11 hs was master of the organ harpsichord violin end other instruments and was proficient in musical composition When 20 years of age he produced he first opera which was favorably re ceived He went to Italy to study the Ital an style of opera and there his brilliant performances on the harmschord surprised audiences by their rare beauty

Handel next went to London where his triumph was repeated England offered so much in the way of opportunity and appreciation that when 41 years of age Handel became a naturalized Figlishman

Seven years later he began his cireer as an English composer using from that time only English texts for his oratorios It is to these that his greatest fame is due



Master of the Oratorio

Other musicians were composing operas, but English oratorio, as composed by Handel, was an innovation. The English people loved his music, and the royal family were always his stanch supporters. Handel grew old, blessed by the comfort of his music and many friends. The bitterest trial of his life came in his later years, when he became totally blind. Yet he still played and conducted his oratorios.

Handel will never cease to be revered as one of the greatest of composers. Besides his 18 English oratorios, his works include 41 Italian operas, 2 Italian oratorios, 4 English secular oratorios, 3 volumes of English anthems, 1 volume of Latin church music, 3 volumes of Italian vocal chamber music, 37 instrumental duets and trios, and 4 volumes of orchestral music and organ concertos.

HANDWRITING. Sloppy, careless handwriting suggests a sloppy, careless person. The ability to write neatly and clearly should therefore be cultivated as carefully as good table manners. Good writing is important in social life, for invitations and most personal letters are properly handwritten. It is important also in business, for even though business letters are typewritten today, short notes and memorandums are usually written by hand.

In the United States two systems of handwriting are in general use. Manuscript writing looks very much like typing or printing and in fact is often called "printing." Both capital letters and small letters are formed individually and are not run together. The characters are written vertically rather than slantwise, and many of the letters are made up of several individual strokes of the pen. Manuscript is actually the older form of handwriting, but it was not taught in the schools of the United States until after the first World War.

Cursive writing is what many people mean when they use the term "handwriting" or "script." In cursive, the small letters and many capitals are run together within a word. Such writing ordinarily slants to the right, and several of the letters, such as f and s, look very little like the printed or manuscript forms. Generally speaking, manuscript writing is easier to learn and to read, while cursive has the advantage of greater speed.

In schools now, children are usually taught manuscript writing first, beginning in the first grade. They practice writing at the blackboard, for the large movements of the arm are easier to control than the small ones of the hand and fingers. When writing on paper is begun, it is done with a soft pencil on large sheets of fairly rough paper. Later, often in the third grade, children are taught to use the pen. After mastering the steel pen, children are allowed to use fountain pens in many schools.

An increasing number of schools teach manuscript writing throughout the grades. Where cursive is taught, it is often introduced in the intermediate grades. Children are usually encouraged to keep up their skill in manuscript, however, because of its usefulness in drawing, science, and other subjects.

From the beginning, left-handed children should be allowed to write with the left hand and should be taught how to place the paper for greatest ease in writing.

A compromise between manuscript and cursive called *joined manuscript* is sometimes taught. The letter forms are those of ordinary unjoined manuscript, but many of them (such as m and l) are given "tails" that connect them with the following letter. Joined cursive may be used to make the transition between manuscript and eursive or it may be taught as a regular form of handwriting.

Although the subject has nothing to do with the teaching of penmanship, teachers are sometimes asked about the validity of graphology. According to the lore of this so-called science, a person's character can be deduced from his writing. Some general traits of personality may be expressed in an individual's writing, but psychologists deny that handwriting is a detailed expression of personality. The claims of graphologists are therefore largely false.

HANG/CHOW, CHINA. When Marco Polo, the greatest of medieval travelers, visited Hangchow near the end of the 13th century, he was delighted with the number and splendor of its mansions and the wealth and luxury of its people. Later he declared it to be the finest and noblest eity in the world (see Polo, Marco). It still ranks as one of the richest eities of China. though it lost much of its ancient magnificence when it was laid in rums by the Taiping rebels in 1861. Its shops are noted for their size and the excellence of their stock, and its manufactures of silk, paper fans, tapestnes, ivory carvings, and lacquered were are world famous.

Hangchow, which is about 100 miles southwest of Shanghai, lies near the head of the estuary of the Tsien-tang River, 50 miles from the ocean. Although the river is visited at certain seasons by destructive "bores"—great tidal waves 15 feet high which rush upstream at the rate of 15 miles an hour—it is constantly crowded with small craft which transport vast quantities of merchandise to and from the southern provinces. An immense amount of traffic is also carried by the Grand Canal. which ends here.

Above all it is a city distinguished for its heritage of culture and for its beauty. The Chinese say, "Heaven above. Soochow and Hangchow below." The old city, now partly modernized, lies on the shore of Si-hu, or West Lake, at the foot of the Eye of Heaven Mountains. Its monasteries and splendid Buddhist temples attract thousands of pilgrims and visitors. From the 10th to the 13th centuries it was the capital of southern China. In 1896 it was opened to foreigners. Japan held the city from 1937 to 1945. Population (1947 estimate), 437,522.

HANKOW', CHINA. Though Hankow is 600 miles from the sea, it is one of the world's great ports. Ships of all nations steam up the Yangtze River from Shanghai to this noisy, crowded city far inland in Hupeh province. It stands at the junction of the Yangtze

### HANNIBAL'S ELEPHANTS MOVE TOWARD ITALY

and the Han Across the Han is the city of Hanyang, and on the south bank of the Yangtze is Wuchang, captal of the province This 'Trible City' of Hankow, Hanyang, and Wuchang is called Wu-Han and is the industrial and commercial heart of central China

The Triple City is so centrally located that the Chinese call it The Collecting Place for Nine Previouses' Shape diawing 30 feet can reach it from Shanchhal it is about milway on the Janton Penpang(Peking) alivay, and roads and waterways fan our from to all parts of the water and the Chington Plant To its semantic for the water and the Chington Plant To its semantic for the water and the Chington Plant To its semantic for the water and the Chington Plant To its semantic for the water and the Chington Plant To its semantic for the water for th

mills and factories and docks come hides and skins, wheat, tobacco, cotton silk, rice beans, tung nuts, tea, sesame seed iron coal

and antimony
Of the three cities, Hankow is the most important
Opened to foreign trade in 1858, its chief business is
exporting. Junks, steamers andlightersureally row
the yallow surging river. In the native quarter, wheel
barrows and shouting groups of bargaining shock
seepers and customers elog the nation streets. But
the foreign congensions and business sections as eimine foreign congensions with surious sections as eimine foreign congensions with surious sections as eimine foreign congensions.

poung and efficient
Ancient Vuching is chiefly a receiving center for
inland trade. Hanyang is industrial, and China a first
modern iron amelier as a built here in 1590 Gloved
by a steel null. Hanyang once promised to become a
beging on and steel entire but financial ironbles halled
as to an adverse of the control of the control
1938 many of its 1 250 000 people field and the letexture Chinace army destrived secret of factories

The Japanese held the city until 1945 Population of

Hankon (1947 e-t.) 749 972
HANNIBAL (about 227-188 a c.) "I swear that so soon as age will permit, I will follow the Romans both at sea and on I and I will use file and steet to arrest the destiny of Rome". The boy Hannibal shoot at the altra beade has father, the great Carthagnaia general Handear Barea, and repeted the strength and the same and the same

with him that he might learn the ways of war and prepare to renew the death struggle with Rome



to gent heart, of wer. In hattle, the stephents were armored ag much the same way as tenks ere used today

So well ded flaambel levm his lewon that sites has fether death he succeeded to the coronand of the samy in Spain, and tines years later (218 a c) has prepared to renew the context to which he had been dedicated. While the Roman senate was planning to made the Carthagains domains. Hamibd was already starting on the most during march known to the snearth voil.

Along the eastern coast of Spain, over the Pyrences Mountains and across the swith waters of the Rhone, he led his forces of 50 000 foot soldiers, 9,000 horse men and stores of elephants. It was sheady suturn and the cold was intense when this band, accustomed to the enany lands of Africa and Spain, began to cross the perilous Alps. Blinded and atmost overwhelmed by snowstorms, over steep and narrow paths they struggled, cheered and encouraged by their dumities beater. In places the natives rolled heavy stones leader in places the natives rolled heavy stones of the places of the present of the places of the pla

northern Italy
By the shilfed use of cavairy tactics, in which the
Romans were weak, Hantubid won two great victories, at the Techa Ruer and at Lake Trassience
Alarmed at these dausters, which had shaftered one
army and searly destroyed another, the Romans
appointed a dictator—an official invisted with
extraordurary power Their choice fell upon a wise
stateman named Quintus Fabius Maximum Instead
or risking an engay-ment at once, Fabius adopted a
policy of following the Carthagman army, delaying
it and harisasson fat in every possible way. Because of

his cautious tactics he was nicknamed *Cunctator*, or "delayer," and even to this day cautious generals who practise similar tactics are said to pursue a "Fabian" policy.

At last, in the summer of 216 B.C., a Roman army of hetween 70,000 and 100,000 met Hannihal's band at Cannae, near the southeastern coast of Italy. Though far outnumbered, Hannihal managed by clever strategy to surround the forces of his enemy and annihilate them. Ex-consuls, senators, nobles, thousands of the best citizens were among the 60,000 slain. Of the gold rings which they wore as an indication of their rank, Hannihal is reported to have sent a bushel to Carthage.

Won a Great Battle but Lost the War But the victory hore little fruit, for Hannibal was one man fighting against a nation. He failed to receive support either from his own countrymen or from the Italians that he subdued during the 15 years that he remained in Italy. His brother Hasdrubal, coming to his aid with reinforcements from Spain, was met by a Roman force, completely defeated, and slain. His severed head was hurled into the camp of Hannibal, who anxiously awaited him. Still Hannihal struggled on, until a Roman army under Scipio Africanus invaded Carthage and he was forced to return home. At Zama in his own country, the lion-hearted commander who for 15 years had ravaged Italy suffered a crushing and final defeat. The long battle for supremacy was ended and Rome was mistress of the Mediterranean.

Hannibal now showed that he could be a statesman as well as a soldier. Elected chief magistrate, he reformed and strengthened the government of Carthage and contrived to pay, without hardship to the people, the heavy tribute exacted by Rome. The Romans, alarmed by this prosperity and by the charges of his enemies that he was plotting to renew the war against Rome, demanded Hannibal's surrender. To avoid falling into their hands, he fled to Asia, and when several years later the Romans hunted him out, he took poison, which, we are told, he always carried with him in a ring.

So died one of the greatest and most gifted military

threatened the Roman Republic at the height of its powers. (See Carthage.)

HANOVER, GERMANY. For more than 120 years the kings of Great Britain were also German princes, ruling the kingdom (formerly electorate) of Hanover in northwestern Germany. This came about when George I, founder of the Hanoverian (or Brunswick) line, ascended the English throne in 1714. It ended in 1837 when the death of William IV, great-greatgrandson of George I, left the Hanoverian line without a male successor. In England, Victoria ascended the throne. But Hanover's Salic law, forbidding female succession, denied her the Hanoverian crown.

In the war hetween Prussia and Austria, in 1866, Hanover was allied with Austria, and victorious Bis-

leaders of ancient times—an ardent patriot, a crafty

strategist, and the most formidable foe that ever

marck then annexed it to Prussia. It became a Prussian province, with an area of 14,897 square miles, and a population of about 3,540,000.

The city of Hanover, capital of Lower Savory, which includes the old province, contained an irregularly huilt "old town," with many quaint stucco-front houses, and handsome new quarters to the north and east. Hanoverians built many beautiful parks museums, and picture galleries to house a rich collection of art. For years the city attracted foreign

students, especially English, eager to study Harover's reputedly pure form of the German language. A wide variety of manufactures—including hardware chemicals, machinery, and textiles—grew up in the historic city. As a center of industry and transportation, it was heavily bomhed during World War II Population (1950 census), 444,296.

HANSEAT/IC LEAGUE. A fleet of tall-masted ships

met in the sound off the coast of Denmark in the spring of 1368. They came from the cities of norther. Germany belonging to the Hanseatic League, which was at war with the king of Denmark. For two years they harassed the Danish coasts and waters, sacked Danish cities, and plundered their treasures. At the end of that time the king of Denmark was glad to make peace, although the terms exacted were most humiliating. The cities of the League demanded a share in the Danish revenues for 15 years, the possession of Danish strongholds, and the final voice in the selection of the Danish kings.

This episode in the history of the loose confeders-

tion of North German cities known as the Hansetic League gives an idea of the power it then possessed. It had been growing up gradually. No one knows just when it began. More than a hundred years earlier cities had formed alliances or "hansas" to protect their traders from the plundering barons along the highways and the pirates upon the secs. These alliances proved so useful that gradually more towns joined the strongest league, of which Lübeck was the center, and this union hecame known as the Hanseatic League.

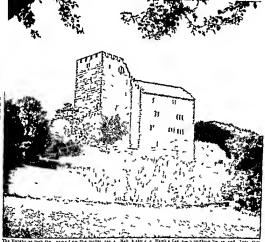
Just how many towns were in the league no ore knows. Even its ambassadors in London, when asked for the number of towns, scornfully replied that they could not be expected to know all the places, large and small, in whose name they spoke. At the height of its power in the 14th century it probably contained nearly 100 cities, extending from Dinant in Belgium to Cracow in Poland, and its "factories" or trading posts stretched from the "Steelyard" in London to the "Court of St. Peter's" in the faraway of the of St.

city of Novgorod, Russia.

In these foreign factories the representatives of the league lived almost like monks. They were forbidden to marry as long as they remained abroad. They could not leave the factory at night. Iron doors, savage dogs, and watchful guards were provided to enforce this rule. They could not associate with the people of the country except for business purposes, and they were required to be rigidly honest in their

HAPSBURG DYNASTY

HOME OF THE PROUD



dealings for the dishonesty of one would bring the wrath of the townsmen upon a l

But the advantages more than balanced these restrict ons Merchants of the league were exempt from the taxes and tolls levied ut on others. And in some places they had a monopoly of a certa n trade as of the herring fi heries off the coast of Sweden At the height of its po er the league not only protected its merchants but also mainta ned its fleet and even engaged in war to safeguard to inte ests. It played an important part in suppressing lawlessness in carrying comforts and conveniences into half barbarous lands and n promoting enlightenment and

 vil zat on throughout northern Europe But quarrels between the towns gradually weakened the influence of the league for it was only a loose union who e assembly met e ery year or two but had no authority to enforce its dec sons. The rise

of trong political states such as Denmark created n als and enemies for the Hanva The discovery of Amer ca and of the route around Africa lessened the commerc al importance of most of the North German et es But the deathblow to the league came when the berring suddenly deserted their haunts off the shores of Sweden for the coast of Holland The exclus ve control of the herring fisheries had been the most highly prized privilege of the league and with that gone the members lost interest. By 1630 most of the towns had deserted the all ance but the free ctes of Hamburg Lubeck and Bremen continued to be known as Hanza towns unt I the latter part

of the 19th century (see Bremen Hamburg) HAPSBURG On the top of the Wülpelsberg (168? feet buch) in northern Switzerland near the muct on of the little river Reuss with the Aar stands the Hawk a Castle (Habichtsburg) which was the original seat of the famous Hapsburg (or Habsburg) family. The castle was erected in 1020, and its owners ruled Austria from 1278 to the end of the first World War. With only one exception (Charles VII, 1742-1745), all the rulers of the Holy Roman Empire from 1438 until the abolition of the empire in 1806 were members of the Hap-burg house The Emperor Charles V (1519-1556) was by descent

on his father's side a Hapsburg (see Charles V, Holy Roman Emperor). After the division of his dominions there were two Hapsburg houses, one ruling Spain until the extinction of the line in 1700, and the other Austria A full lower lip and a long pointed chinthe famous "Hapsburg chin"—became family features after a marriage with a Bohemian princess in the 15th century. (See Austria-Hungary.)

# SHELTERED HAVENS for the WORLD'S SHIPS



From the heights of Victoria, on Hong Kong Island, we look across the ten square miles of its land-locked harbor toward Kow'oca Pennsula and the Chinese mainland. Hong Kong is the chief port of southern China, nivaling Shanghai in the tomage it handles.

From ocean vessels cargoes are transferred to river craft or railroad cars for shipment to Canton.

HARBORS AND PORTS. The destiny of nations is to a great extent influenced by their coast lines. Commerce, with the progress in civilization which follows on its heels, most readily springs up where there are well-sheltered harbors in which ships may safely load and unload their cargoes. Despite its vast potential wealth, Africa, with the exception of the narrow strip along the Mediterranean, remained undeveloped until the 19th century largely because it has so few natural harbors. On the other hand, the civilization we enjoy today was born in the Mediterranean lands, where many safe harbors tempted men to traverse the sea and interchange products and ideas. One of the controlling factors in bringing about the differences between the "unchanging East" and the changeful West has been the abundance of harbors in Europe and their comparative scarcity in Asia.

The discovery of America turned the face of Europe westward, and the excellent harbors on Europe's west coast brought wealth and power to the countries owning them. Nearly all the early centers of settlement in North and South America were at some bay or river mouth which afforded shelter to the vessels of the first arrivals. The rapid

growth of the United States and its commercial and industrial importance are due in part to its long strip of coast on the two great oceans, dotted with fine harbors. In South America, Bolivia and Paraguav are hampered by the lack of seacoast. Bolivia once owned the harbor of Antofagasta, but lost it to Chile in 1883.

Rivalry between nations for harbors has brought many bloody wars, for the state without a coast line is at the mercy of any state who-e territory it must cro-s to reach the ocean. The inland country battle for a strip of land along the sea, a single port, or even the establishment of a "free port" where its goods may be shipped without customs duties. At the end of the first World War the victorious Allies punished Austria by stripping it of its seacoast on the Adriatic and thus strangling its trade. And they rewarded the Poles by giving their restored country a corridor to the sea with unrestricted use of the German port of Danzig.

How Harbors Are Classified

Natural harbors are classed, according to their origin, as drowned valleys, deltas or river-mouth harbors, fiords, and lagoons. A good harbor must afford safe anchorage for vessels, protected from

FOR UNLOADING

storms deep enough for the large t ships to come close to shore and broad enough tor many we els and must have a direct channel to the open water In order that a good harbor may levelop into an important port there must be the faril er advantages

of freedom from ice and abundant room for docks piers wharves loading and unloading facil ities and ware houses There must al o be a brond area for the growth of a city and easy direct acce s to a prod e tive interior The interior should fur nish products for shipment and use raw materials brought in through the port for manu



delphia San Francisco Seattle London Liverpool Hamburg and Chanchai owe their growth to the possess on of all these advantages. These harbors are drowned valley formed by the sinking of the coast line which let in the sea to deepen the mouth of the river for a considerable distance Rivers Gut Through Deltas to Seas

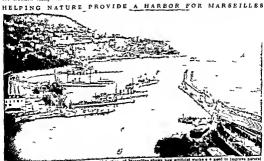
Great rivers such as the Mi sissippi the Amazon

the Nile, and the Canges are ever thrusting forward into the sea deltas formed from the vast quantites of silt brought down t v the current from distant h ghlands These rivers have c t several chan nels through the deltas to reach the sea The advantage of a long river route back into the con finent is why such a city as New Orleans is located near the heal of a delta But great sums mu t be spent to dredge out the silt and to build

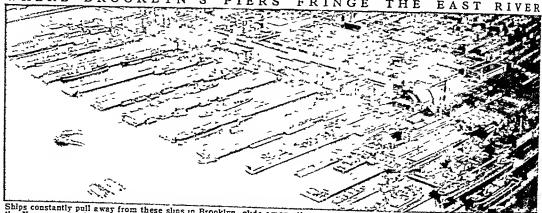
jett es to force the

current to scour out its own bed to deep water Fiords 1 ks most of those whose entranging beauty

lures thousands of tourests every a immer to Nor vay a western coast can never become ports because the



#### BROOKLYN'S PIERS FRINGE THE EAST



Ships constantly pull away from these slips in Brooklyn, glide among the swarming traffic of New York harhor, and plow through the Narrows into the Atlantic Ocean. Piers and wharves stretch for 755 miles along the waterfront of the Port of New York of this total, 460 miles are in New York City and 295 miles in New Jersey. This immense seaport handles nearly one first of the country's exports, about one fourth of its imports, and a vastly greater amount of coastal and intercoastal shipping

steep mountain walls leave no room for a city and bar easy communication with the interior.

Lagoons are produced by sand barriers or coral reefs. They are numerous in the southeastern United States. Galveston is an example of a lagoon harbor that has been improved to make it a splendid port.

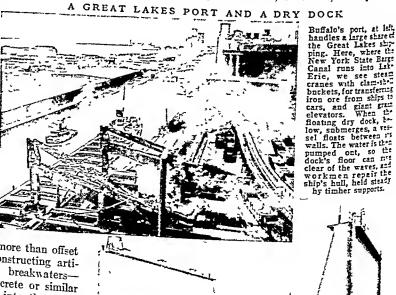
Inland Cities Made into Ports Inland cities have been transformed into seaports by dredged rivers and canals. Manchester, England, is connected with the ocean by the Mersey River and a canal 35 miles long, so steamers may unload car-

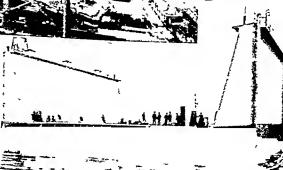
goes directly into its mills. The largest ships reach Hamburg, Germany, 75 miles from the sea, because continuous dredging has deepened the channel of the Elbe to about 40 feet. Its vast harbor was made almost entirely by excavation. Houston, Texas, has a 35-foot canal bringing in ocean vessels. Chicago, 1,000 miles from the ocean, and other Great Lakes harbors receive shallow-draft ships via the St. Lawrence and Mississippi rivers and canal systems. The proposed St. Lawrence Seaway would bring in ocean liners.

The profits of commerce more than offset the immense expense of constructing artificial harbors. Tremendous breakwatersgreat walls of stone or concrete or similar material—are built far out into the ocean to break up heavy seas and afford a safe refuge. Artificial harbors are made by such breakwaters. Dover, England, has one of the largest artificial harbors in the world. More than two miles of concrete breakwaters en-

close a square mile of anchorage with a minimum depth of 40 feet. A two-mile breakwater protects the anchorage at Hilo, Hawaii, from northeast trade winds. Madras, India, on an open roadstead, has been made a port by extensive harbor works which protect ships against the monsoons.

Wet Docks and Dry Docks In harbors where there is a great range of water depth between high and low tide, as at London, Liverpool, and Le Havre, it has been necessary to construct huge wet docks, or basins, usually mede





of concrete with gates that na ntain the water level when he t de roos out.

All great harbors are qu pped with dry docks and ther facilities for repairing hips and cleaning their hulls dry dock is a large bas n sult of concrete which can be losed with watertight gates fter a vessel has entered The water is then pumped out it allowed to run out with he tide the ship being held pright by shores or long mber supports while work sen scrape mend or paint the ull Adjoining the dry dock

re repair shops Good harbors need constant ttention Currents and t des .ilt up old channels and open new ones Cont nuous dredging is necessary to mantain navi

gable depths The increasing s se of liners and the growing magn tude of trade are bringing repeated enlargements of port facilities At a cost of 6 m llion dollars Ambrose Channel into New York harbor was deepened to 40 feet at low tide and widehed to 2 000 feet for seven in les The p er and wharf capacity were also greatly extende I Other harbor facil ties are continually modernized

and improved as they grow too effic ently

The large porta have m les of pers and alps with enormous warehouses and all the most m proved devices for load ne and unload ng steamera-electric cranes automatic hoists endless belts and pneumatic tubes and pumps which move such prod ucts as wheat or o I from the hold of a vessel to storage build ngs or to wa ting freight cars

The United States govern ment makes large annual appropriations for harbor maintenance and improvement Bes des the continual dredging new surveys are constantly being made and new charts prepared for the gu d ance of mariners Lighthouses lightships beacons buoys range finders rad o s gnals leader cables and other equip ment to guide ships through narrow winding harbor entrances in darkness or in fog must be in stalled improved and repared SHANGHAI - CHINA S BUSIEST PORT



ped build the city gave up their concessions after the aecond World We

if the ports are to be kept asfe for nav gation (See also Lighthouses and Lightships Navigation ) The making and ma ntenance of aids to nay gat on are dut es which belong to or have been assumed by the nat onal government but the provision of ade quate terminal facilities usually falls to state or city (See also Harbors and Ports in Fact Ivnex )

old to handle heavy commerce ROYAL DOCKS AND THAMES RIVER AT LONDON



es the Tharnes Sh ps pass into the basins through locks

# In the WHITE HOUSE after the First WORLD WAR

HARDING, WARREN GAMALIEL (1865-1923) Few presidents have come into office with a more difficult task confronting them than that which faced the 29th president of the United States on his inauguration, March 4, 1921.

In the first place, owing to party differences, the Versailles peace treaty, in the negotiation of which President Wilson had taken part on behalf of the United States, had failed of ratification in the Senate. This left the United States technically in a condition

of suspended warfare with Germany and Austria and with no share in the new League of Nations-which, indeed, had been the chief stumbling-block to the ratification of the peace treaty. Friends of Germany and Austria were resentful at the harsh terms imposed upon those countries; an irreconcilable group of Republican senators demanded the complete "scrapping" of the League of Nations covenant: humanitarians urged that the United States and the suffering Armenians in safeguarding their new freedom against the massacring Turks; radicals demanded that Bolshevist Russia should be given a chance to work out its salvation, while reactionaries clamored for more stringent

measures against "reds" of all sorts; jingo elements labored indefatigably for sterner measures against Japan and Mexico; and the "Friends of Irish Freedom" everted every pressure that could be brought to bear to induce the United States to recognize the independence of "the Irish Republic."

Serious Problems to Be Faced at Home

Domestic problems were equally pressing. Heavy taxation and the "high cost of living" were legacies of the war; and business demanded relief from the one while the buying public clamored for a lightening of the burdens of the other. A financial stringency and much unemployment accompanied the economic readjustment. Labor and capital were equally tenacious of advantages gained and resentful of losses incurred. The relinquishment by the Federal government of those powers of control over public necessities—such as food, fuel, and transportation—which it had perforce assumed during the war, carried with it no release from the exceptional problems arising out of these necessities in the transition to peace.

Warren G. Harding of Ohio, who was nominated for the presidency on June 12, 1920, by the Republican convention at Chicago, was a "regular of regulars," and his personality has been compared to that of his Ohio predecessor, President McKinley. He was born in Corsica, Ohio, where his father was a local physician. He was educated at Ohio Central College. Iberia, Ohio; became the publisher of the Marion (Ohio) Star; married in 1891 Florence Kling of Marion; was elected to the Ohio senate in 1900, and to the lieutenant-governorship in 1904. He was the unsuccessful Republican candidate for the governorship of Ohio in 1910; and in 1915 was elected to the United States Senate. As a member of the Senate Committee on Foreign Relations, he had favored the

ratification of the peace treaty with reservations "sufficient to safeguard the interest of the United States of America."

The Campaign

Up to 1919 it was generally believed that Theodore Roo-3velt would be the Republican candidate in 1920, but his death left the field open to others. Of these, Gen. Leonard Wood Senator Hiram Johnson of California, and Gov. Frank O. Lowden of Illinois were most prominent and had the most support among the Republican rank and file. Harding at the outset had few supporters, but when a deadlock ensued in the convention held at Chicago, the leaderagreed to his nomination. For the vice-presidency, the convention



selected Gov. Calvin Coolidge of Massachusetts.

Several candidates competed for the Democratic nomination in the convention which met at San Francisco, but ultimately the choice fell to Gov. James M. Cox of Ohio, with Franklin D. Roosevelt of New York as the nominee for vice-president.

Neither Harding nor Cox had previously been figures of national interest, and their personalities and records played little part in the campaign. In the preceding January, President Wilson had asked for "a great and solemn referendum" upon the League of Nations, and this was outwardly the campaign issue but, in reality, it was whether or not the people approved the Wilson administration. The election resulted in a tremendous landslide for the Republicans Harding received 404 electoral votes to only 127 for Cox, and a popular plurality of about 7,000,000 votes For the first time since 1876 one of the Southern states, Tennessee, cast its electoral votes for the Republican candidates.

In his inaugural address, President Harding indicated that one of the main aims of his administration was to secure a return to "normalcy." To help achieve this process, he called Congress in special session in April 1921, and a number of important measures were passed, including the adoption of a national budget HARDING S ADMINISTRATION

1921-1923

Budget Bureau established

Treaty ratified giving Colombia

Bill passed restricting immigration

Peace with Germany and Austria declared (July 2 1921)

Washington Conference on Limitation of Naral Armament

Strikes of Coal Miners and Railroad Shop Workers (1922)

Fordney McCumber Teruff Act restores Bigh Protection

Soldiers' Bonus Bill vetaed

Republicans lose 14 seats in the Senate and 150 in House

Investigation at Teapot Dome Oil

Lease Scandal begins

Last of American Troops on Rhine ordered home (1923)

Death of President Harding (1923)

\$25 000 000

system, the passage of a joint resolution declarant the war with Germany and Austria at an end, and the enactment of acts revising the tanff and further benting immigration. The immigration act provided that the number of aliens who could in any one year enter the United States should not exceed three per cent of the persons of that nationality resident in this country in 1910 (see Immigration) The first tariff act passed was an emergency measure, and it was superseded in 1922 by the Fordney McCumber Act which provided the highest duties in United States history

Foreign Policies

In foreign affairs President Haeding a policy was to keep the United States from becoming involved in European politics During the campaign his position on the League of Nations usue had been equivocal but after his inauguration he made it clear that he was

definitely opposed to entering the League The administration withdrew the American unofficial representatives on the Reparation Commission and refused to have any formal part in League deliberations American troops in Germany were gradually withdrawn and in January 1923 the last of

them were ordered home President Harding did not however, share the views of those who favored complete American isolation He repeatedly expressed his desire to strengthen the bonds of friendship between nations and to promote peace. He urged American participation in the Permanent Court of International Justice at The Hague and called an international conterence to meet at Wash

ington in November 1921 to consider naval reduction and tertain Pacific and Far Eastern questions The principal naval powers invited were Great Britain France, Italy, and Japan Invitations were also sent to China, and to certain smaller European powers such as Belgium, Portugal, and the Netherlands, who

had interests in the Far East

The idea of the Washington Conference was recerved with great enthusiasm, and the nations were represented by emment statesmen, notably Ballour of England, and Briand of France President Harding hunself welcomed the delegates, but the actual coarse which the United States took was directed by Secretary of State Charles E Hughes With a boldness seldom seen in a diplomatic meeting he proposed that there should be a naval holiday for ten years His plan stipulated that a large number of ships in the navies of the United States, Great Britain and Japan should be scrapped, and that the ratio in power in capital ships between these nations should be 5-5-2

respectively Differences of opinion naturally devel oped over the various details of this proposal but several important agreements were finally reached Results of the Washington Conference

This conference was the most conspicuous achievement of President Harding's foreign policy. It resulted in an agreement between the United States, Great Britain and Japan accepting the naval holiday plan and the 5-5-3 ratio, and providing for the scrapning of over threescore vessels Italy and France also agreed to limit their capital ships to a strength about one-third that of the United States and Great Britain Restrictions were imposed upon the use of submarines and the use of poison gas in warfare was forbidden

Another treaty between the United States Great Britain France and Japan bound them to protect one another a rights to their insular possessions in the

Pacific and in cases of disagreement that could not be settled powers including also Belgium maintenance of China a term tor al integrity and sovereign to withdraw from Shantung No agreement was reached regarding cruisers and other subfater resulted in a serious diplo-

by diplomacy to submit the dispute to a conference Two more treaties between these China, the Netherlands and Portugal provided for the ty, and the principle of the open door "Japan also agreed ordinate naval craft and this make controversy

During the war prices had men to unprecedented levels. and an orgy of speculation soon followed the armistice Money was obtainable at easy rates and people failed to real

use that with a large part of the world impoverished by strife the seeming prosperity of the United States could not Last Land prices in various parts of the country especially in the middle west and north west were doubled impled even quadrupled, and specula tion was rampant in many industries. Before the end of 1920 the mevitable deflation began, bringing hard tunes and financial ruin to millions.

The Farmers Problems Clamerous demands for government relief were raised, especially by the 'farm bloc," an informal non partisan preprization of congressmen especially interested in the problems faring agriculture. A num ber of measures designed to aid agricultural interests were passed but none was very helpful By 1923 business was making a steady return to normalcy, but the farming conditions throughout the United States continued unstable and various remedies were proposed A number of things combined to make the farming estuation acute. One of these was the substitution of motor power for horse power on the farms. The number of horses and mules used on the farms decreased by the million, and tens of millions of acres of land that would have been required to raise and feed such animals were used for other purposes. The expansion of the production of wheat, cotton, and foodstuffs, stimulated by the high prices and the great demand from Europe during the first World War, produced a surplus on the world market. The farmers were reluctant to reduce their acreage. The result was a fall in the price of farm products and lands.

The effects of hard times and the usual backward swing of the political pendulum were evident in the congressional elections of 1922. The Republican majority in the Senate was cut from 24 to 10, and in

the House from 165 to 15.

President Harding's cabinet contained Charles Evans Hughes, Herbert Hoover, and other men of great ability and integrity. Unfortunately some members of the Cabinet were not so admirable. Early in the administration, the President approved the transfer of certain government oil lands at Elk Hills in California and Teapot Dome in Wyoming from the Navy Department to the Department of the Interior. These oil lands were then leased to the Doheny and Sinclair interests. There was nothing essentially dishonest in such a transaction, though the leasing of such lands was opposed by conservationists. Later, however, it was revealed that after granting these leases, Albert B. Fall, secretary of the interior, received large sums of moncy under the pretense of "loans." The disclosure of these and other facts aroused popular indignation. In the meantime, Fall had resigned from the Cabinet and was therefore beyond the power of impeachment. However, he was later prosecuted and after long delays ultimately convicted for his part in the affair. Doheny and Sinclair were also brought to trial but escaped conviction, though Sinclair served a jail term for contempt of the Senate. Cancellation suits were also brought-on the ground that the leases had been obtained by fraud and won, the oil lands being restored.

Public distrust also fell upon Attorney-General Harry M. Daugherty because of his share in transferring the oil leases and hecause of certain other activities. The accusations against him were felt to be the more serious because he was a close friend of the President and had managed his campaign. After the death of President Harding, and at the demand of President Coolidge, Daugherty resigned. He was tried for conspiracy with the alien property custodian, but the jury disagreed, and the case was dismissed.

President Harding was spared the humiliation of most of these revelations. In June 1923, with his wife and a large party, he set out on a tour of the West and Alaska. On his return to Seattle he was taken ill. He was removed to San Francisco and while apparently recovering, he died of an apoplectic stroke on the evening of August 2. His body was taken to Washington for the state funeral, and afterwards to a

mausoleum at Marion, Ohio. President Hoover, upon the dedication of the Harding tomb in 1931 said "Warren Harding had a dim realization that he had been betrayed by a few of the men whom he had trusted, by men whom he had believed were his devoted friends. It was later proved in the courts of the land that these men had betrayed not alone the friendship and trust of their stanch and loyal friend, but they had betrayed their country. That was the tragedy of the life of Warren Harding."

Harding was not a great president, though under him the difficult period of reconstruction was successfully passed, the national budget was balanced, the national debt reduced, and a return to something approaching "normalcy" effected. He himself made no claims to greatness; he said that if he possessed any particularly useful quality it was that of helping

people to "march in step."

HARDY, THOMAS (1840-1928). Although the books of this great tragic novelist are too gloomy and pessimistic to be "popular," he is one of the few writerwhose works have been accepted as classics in their own lifetime. Born near Dorchester in Dorsetshire, England, he passed most of his long life, as did his ancestors before him, in that region of woodland and heath and moor which he calls by its old name "Wessex" and which forms the setting of most of his writings. He was educated at local schools and by private tutors and for a time studied at King's College in London. At 16 he began the study of architecture and at 22 went to London as assistant to an architect He had already begun to write and for a time was uncertain whether to make architecture or letters his profession, but after his first really successful novel, 'Far from the Madding Crowd', was published in 1874, he decided to retire to Dorsetshire and devote himself to literary work. Doubtless architecture had much to do with his wonderful constructive power.

Hardy was interested in the simple primitive men of the countryside with their strong elemental instincts and passions. Still more was he concerned with nature in all its moods and changes, not only as the great background against which man moves onward to his destiny, but as a power entering the very life of man, sometimes sympathetic, more often cruel.

What Meredith called his "twilight view of life" gives to most of his work an atmosphere of melarcholy and pessimism. Though it is thoroughly modern in the realism with which it depicts common life even in its ugly and sordid aspects, it is like that of the old Greek dramatists in presenting the innocent or helpless as victims of relentless fate. This makes Hardy's 'Tess of the D'Urbervilles' one of the most terrible as well as one of the most artistic of all novels.

Hardy's chief novels are: 'Under the Greenwood Tree' (1872); 'Far from the Madding Crowd' (1874); 'The Return of the Native' (1878); 'Tess of the D'Urbervilles' (1891); 'Jude the Obscure' (1895); 'The Well-Beloved' (1897); 'A Changed Man' (1913). His poetry includes 'Wessex Poems' (1898) and 'Time's Laughing-stocks' (1909). 'The Dynast' (1903-1908) is an epic drama in three parts.

HARGREAVES, JAMES (1730?-1778) The obsenuty of James Hargreaves, life contrasts sharply with the world wide importance of his invention the spinning genny Almost nothing is known of his life Probably he was born at Blackburn in Lancashire England and while still a boy, he was a camenter and snumer in Standhill a village nearby Then as now Lanca shire was the center of England's manufacture of cotton goods. The industry however was still confined to workmen a homes and the cards spinning wheels and looms were operated by hand

The story goes that an accident gave Hargresses the idea for his spinning jenny. In his crowded cottage which served h m both as home and workshop he had been experimenting with spinning two threads at one time. His experiments were misuccessful honeser because the horizontal spin lies allowed the threads to fly ap art and become tangled. Then one of his children upset the experimental machine and its wheel con tinued to revolve with the spindles in a vertical position While watching the upset machine it occurred to Hargreaves that a machine with spindles in this posi tion might be successful. He proceeded to build a epinning machine probably in 1764 that would spin eight threads at once. He called it a spinning jeany

for reasons that are no longer known The amount of cotton parn he and his children be gan to turn out alarmed other spinners who feared that Hargreaves machine would put them out of work so they broke into his home and destroyed his machine He moved to the town of Nottingham where he set up a fauly profitable yarn mill and in 1770 he patented the spinning jenny As he had previously "old several of his machines the patent was declared void when brought to a test. This left others tree to use the invention without paying him royalties and consequently the senny came into wide use. The production of cotton yarn increased vastly. Even during his lifetime jennies were built to spin as many as 80 threads at once

Other inventors were also at work in solving the same problem and before Hargreaves death in 1778 mechanical spinning was fully developed by Richard Arkwright and Samuel Crompton Somewhat later this revolution was completed by Edmund Cartwright who invented the mechanical loom (See also

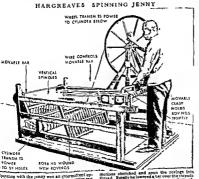
Arkanght Crompton Cartwight }

HARMONICA Learning to play the harmonica or mouth organ is relatively easy and is a good way to start a musical educat on Many former harmonica players are now members of symphony orchestras per forming on string and percussion instruments as well as wind instruments. The harmonica is a free-reed in strument and hence is related to the accordion and reed organ In these instruments the tones are produced by fle tible brass reeds Each reed swings freely

in a narrow slot rather than vibrating against the endes of an aperture as in such instruments

as the clampet Three general types of harmonicas are manufec tured today The plain

l'armonica has ten holes each of which produces two tones of the scale One tone is sounded by blowing through the hole the other by draning breath through it Since the mouth usually covers four holes three of these are stopped off by the tongue Tle scale is played by alternately blowing and sucking in breath at each of the holes in turn Removing the tongue from the stopped holes results in a chord The concert harmenung is similar to the plam barmonica except that an upper bank of hules produces the oc tues of the lower bank The two banks are played simultaneously



Spinning with the jointy was an intermittent op-eration. To set up his machine the operator rat royange (done) fewrited yearns) from the bubbins through the class to the spindles. Then, while through the class to the spindles. Then, while the position in which it is shown here. These the position in which it is shown here. These

motions stretched and spun the rovings inte thread Finelly he lowered a bar over the threads thread Finelly he lawred a out over the track while pushing the class all the way forward with the threads thus held down the spind er would them up instead of twisting them. These Both these types of harmonicas produce only the simple major scale. Consequently instruments are manufactured in a variety of scales, the harmonica in C being the most widely favored.

The chromatic harmonica, the third general type, may be played in any key. It has an upper and lower bank of holes tuned a semitone apart. The two banks are separated by a slider that stops off one bank at a time. This is operated by a knob at one end of the instrument. By blowing in and out on each of the holes and using the slider, the performer can sound the full ehromatic scale. Very large and very small harmonicas and harmonicas of special design are made for the use of harmonica bands, but all these conform in general to the types described here.

The harmonica was probably invented by Sir Charles Wheatstone, the British scientist, and was first manufactured in 1829. It was then called the aeolina. German manufacturers produced the instrument in quantities and popularized it in Europe and

in the United States.

A totally different instrument, invented in the 17th eentury and improved by Benjamin Franklin, was also called a harmonica. Franklin's harmonica consisted of a number of glass bowls, each tuned to a note and fastened on a long spindle that was made to revolve by working a treadle. The sounds were produced by resting the fingers on the rims of the turning glasses. Playing these musical glasses was a fashionable accomplishment for a time, and music for them was written by Mozart, Beethoven, and others.

HAROLD, KINGS OF ENGLAND. Only two kings of England have borne the name Harold. Both of them reigned before the Norman Conquest (1066).

HAROLD I (ruled 1035-1040) called Harefoot, was a son of the Danish king Canute, who ruled Deumark and Norway as well as England (see Canute). When Canute died, Harold elaimed the English crown in opposition to his half-brother Harthaeanute, who happened to be in Denmark at the time. On Harold's death, Harthacanute succeeded to the English throne but died two years later while attending a wedding feast.

HAROLD II (born 1022?, ruled in 1066), the last king of the Anglo-Saxon period, reigned only nine tempestuous months. He was the son of the powerful Earl Godwin and was himself Earl of East Anglia and of Wessex before he was chosen king, succeeding the childless Edward the Confessor.

Hardly had Harold come to the throne, in January 1066, before he was compelled to take his army north to face an invading Norwegian force. After his victory he soon had to hasten south to face another invading army under William, Duke of Normandy (see William I, the Conqueror). Harold met William at Hastings and fell on the field of battle (see Hastings, Battle of).

William based his claim to the English throne on a promise he declared he obtained from Harold while Harold was in Normandy in the days of Edward the Confessor. The famous Bayeux tapestry shows Harold taking the oath to support William, We cannot be sure of this incident because the tapestry was made by Norman women and doubtless presents William's elaim in as strong a way as possible. (See also English History.)

HARP. The graceful shape and beautiful tones of the modern harp are the result of several thousand years' development, for the harp is one of the oldest of musical instruments. The modern orehestral harp is roughly triangular in shape. The strings are stretched between a tapered sounding board, which rests against the player, and a curved bracket at the top of the instrument. Connecting the bracket and the base of the sounding board is a hollow upright pillar. Through this pillar pass rods, worked by pedals at the base of the harp, by means of which the pitch of the strings is raised.

By the use of the pedals, the harp may be played in any key. There are seven pedals, each governing one note of the scale and its octaves. If a pedal is pressed halfway down, the note is raised a semitone; if pressed fully down, it is raised a full tone. At one side of the grooves in which the pedals work in the pedestal of the harp are two notches; the pedals are hitched into these when they are used The modern harp usually has about 46 strings, and each of these is eapable of producing three tones. The instrument, accordingly, has a very wide range. When no pedals are used, the orehestral harp sounds in the key of C flat major.

History of the Harp

The idea of the harp may have originated with the bowstring, which often gives out a pleasant musical note when it is plucked. It is easy to see how some musically inclined hunter may have added other strings of different lengths, thus producing an instrument on which simple melodies could be played.

An old Greek legend eredits the god Hermes (Mereury) with the invention of the cithara, or lyre, a harplike instrument of ancient times. According to the myth he made the first lyre from a tortoise shell a few hours after his birth. The great antiquity of the harp is shown by Egyptian tomb paintings Thousands of years old, these pictures depict the harp in various stages of development, from 3 form resembling the hunter's bow to elaborately carved triangular instruments resembling the harp of today. Much like these were the harps used by the ancient Hebrew people in their religious ceremonies The old Irish harp was a small instrument of limited eompass. This harp and the similar Welsh harp have been revived in modern times.

In the 18th century the harp was greatly improved by the addition of the pedals. These were invented by Sébastien Érard (1752-1831), a French manufactur er of musical instruments who was also noted for his improvements upon the piano. By perfecting the harp in this and other ways, Erard greatly increased its capabilities for orchestral use. Now the great scores of Meyerbeer, Gounod, Berlioz, Liszt, and Wagner

are not complete without it.

The harp is one of the SCENE OF JOHN BROWN S RAID most d flicult instruments to play and skillful harp



The Shenandoah (left) and Po then and oak (left) and Potomac (foreground join to carre a gap through the Blue Raige same at Respera Ferry W Va. Here the abol thought John Brown directed his fu e raid in The highway and restroad bridges in the foreground cross the Potomac to Marviand.

of John Brown a Raid in 1859 (see Brown Joln) The village owed both its growth and its decline to its strateg c position It stands on a narrow tongue of land at the junc tion of the Shenandoah

ists are rare

But to evoke its beautiful tones repays long hours of patient study for its music has a special depth and clear haunting richness HARPERS FERRY W Va Lattle Harpers Ferry is only a village but it is one of the most famous places in the United States It was the scene

and Potomac rivers Here the states of West Vir g na Vug na and Maryland meet Although sur rounded by he ghts Harpers Ferry is on the lowest land in West Virgin a The abundant water power at Harpers Ferry led the United States in 1796 to estab lish an arsenal there. This arsenal was the objective of John Brown a unsuccessful raid Because the site provided a natural pass through the Blue Ridge Mountains the town was an important mil tary ob-

jective during the Civil War It was occupied at var 10us times by both Confederate and Federal troops (see Cv l War American) During the war its ral road bridge was destroyed and rebuilt nine times. By the end of the war the town was in ruins Tle gov ernment arsenal was never reopened

Today the h storical relics at Harpers Ferry attract many vis tors Tle oldest building is the home built by the ferryman Robert Harper s he founded the to vn n 1734 as Shenandosh Falls In 1763 the Vir g n a Assembly changed the name to Harpers Ferry On the campus of Storer College a Negro coeducat onal school is the reconstructed room of the arsenal

where Brown fired his last shots Jefferson's Rock high above the town gives a view of three states Thomas Jefferson vis ted there in 1801 and described it as one of the me t stupen dous scenes in nature and worth a voyage across the Atlantic Populat on (1950 census) 822

HARPIES In ancient mythology the harpies were conceived as repulsive creatures—birds with the faces of old women the ears of bears and crooked talons One legend relates how Phineus king of Salmydessus in Thrace deprived of his sight by the gods for his ill treatment of h s sons or for revealing the future to mortals was condemned to be tormented by two harpies who snatched away whatever food was placed before him and devoured it. In Homer their func-

tion is to carry off to the underworld or to some spot beyond human ken those whose sudden d sappearance is desired by the gods. The name harpies means the robbers and they are supposed to be a person;

fication of the storm winds HARRIS JOEL CHANDLER (1849 1908) One character in American literature has endeared America to countless people of other countries. He a the Brer Rabbit of Joel Chandler Harr & Uncle Remus atories Joel Chan Her Harr s like Brer Rabb t h m self vas born and bred in de br ar patch toun was Estonton in the center of Georga tie time Dec 9 1848 some 12 years before the Call War began The boy never knew I s father who died before Joel was born. He I ved with he mother and grandmother and knew from early boyhood what it was to be poor He had red har and freekles A al ght stutter in his speech made him shy but he was champion at all the games the boys played and at

steal ne watermelons There was no public school in the town but a kind ne ghbor paid his tintion to an arademy and he held his own with the other students But Juel Chandler Harris received his greatest education from the people and the creatures he encountered outs is the school room He was always fond of an mals hunt no does and horses in particular and birds held a special fase nation for him He liked to I sten to people talk -the Negro staves he encountered and the old lawser Mr Deometars who had come from Greece and who let Joel rummage at will among the books he had m his office. The post office and general store however was his favorite haunt. Here he sat on the only safe corner of a faded green sofa tilted against the wall and watched and listened to the townspeople who called for their newspapers and letters and

bought their supplies there. The postmaster piled up the weekly newspapers on a long shelf, where each subscriber could help himself. Joel went to the post office every Tuesday and sat there reading other people's newspapers as long as they lasted.

### Apprentice Days on a Newspaper

day One Joel read an announcement which said that a new weekly was to be published nine miles from Eatonton. It was to be called The Countryman and to be modeled after the famous English paper, The Spectator of Joseph Addison and The Bee of Oliver Goldsmith. Joel knew the name Oliver Goldsmith, because 'The Vicar of Wakefield', from which his mother read aloud, was his favorite book. He waited eagerly for that new weekly, and was promptly on hand to read the first copy. It was so interesting

all. And suddenly, among the want ads he saw: Wanted An active, intelligent white boy, 14 or 15 years of age is wanted at this office to learn the printing business. Joel borrowed a pencil from the storekeeper and wrote out the answer. The next time the publisher of The Countryman came to Eatonton, he looked up Joel Harris and told him to get ready to go with him to the plantation. The boy put away his top and his

marbles, "packed his be-

longings in an old-fashioned

trunk, kissed his mother

and grandmother good-by,

and set forth on what turned

out to be the most import-

ant journey of his life."

his own when he discovered

JOEL C. HARRIS



farms created the Negro storyteller, Uncle Remus.

Joseph Addison Turner was the name of the plantation owner and the publisher of The Countryman. Turner became a great influence upon Joel's life. He taught him how to set type, encouraged him to write on

Joel's bent in that direction, gave him the freedom of his library, which was a very fine one, and advised him in his reading. He gave him time to roam the woods and the cabins of the Negroes whenever his tasks in the printing shop were done. He gave him his own colt Butterfly to break and ride.



This is one of the A.B. Frost illustrations for 'The Awful Fate of Mr. Wolf' by Joel Chandler Harris.

Brer Wolf is in the locked chest. that he read every word of it, advertisements and

articles-anything from puns to editorials. One day, when another writer who had been writing a series of Negro sketches failed to turn in his copy, the editor of the paper said, "Joe, can't you carry on this series?" Joel Harris had his own idea of how the Negro should be represented, and he followed his own plan. The result was the first Uncle Remus story of "The

This was the world from

which Joel Chandler Harns

got his education. This was

the world in which he had

time to learn the rich folklore

of the Negro, to love and re-

spect it, and to catch and store

up with his inner ear every

sound and cadence of their

rich, individual speech. For

four years Joel Harris was part

of that world until it ended

when the Civil War was over.

The Beginnings of

Uncle Remus

After the war, Joel Chandler

Harris went to Macon, Ga,

then to New Orleans and finally

to Savannah, on newspaper

assignments. At Savannah he

married Esther LaRose, the

daughter of a French Canadian

whom he had met in a boardung

house. But in 1876, when the

yellow fever epidemic broke

out, the Harrises left Savannah

and Harris joined the staff of

the Atlanta newspaper The

Constitution. He wrote special

Wonderful Tar Baby." It came straight from the good years at Turnwold, the Turner plantation, from long sessions with old slave, George Terrell, and it was the beginning of an authentic, completely sincere. and intuitive appreciation of the folklore of the Negro people. Joel Harris gave that folklore a literary form which has never been matched.

In this manner Uncle Remus came into being, to be acclaimed as enduring literature the world over. Preidents and millionaires, men, women, and children beat a path to Snap Bean Farm, the tree-surrounded home of the Harrises to pay homage to Uncle Remu-Joel Chandler Harris refused to be lionized. He said it was an "accident" that he had created one of the rarest pieces of Americana. He did consent to go to the White House to visit Theodore Roosevelt because the Roosevelt children demanded to know him. But to the end of his days he held to his own great sim-

of American letters. It was not until the first volume of 'Uncle Remus' was fifteen years old that the stories were to find their definitive illustrator. In 1906 A. B. Fre-t

plicity, surrounded by his children and his grand-

children, writing the Uncle Remus stories to the glor.

brought the beloved characters to life in an edition which was dedicated to him

Joel Chandler Harris died on July 3 1908 His home which was called Snap Bean Farm or The Il ren s Nest, because a wren once built a nest in the mailbox, is maintained as a memorial to him

Editions and Biographies Harns books with the r original publishers and dates of publication are Daddy Jake the Runaway and Other Stor es (Century 1901) Little Mr Thimblefinger (Hough ton 1894) Mr Rabbit at Home (Houghton 1895) Nights with Uncle Remus Myths and Legends of the Old Han tation (Fighner 1883 Houghton 1904) On the Plan tation (Appleton 1892) Tar Haby and Other Rhunes (Appleton 1904) Told by Unrie Romus New Stores of the Old Plantation (McClure 190a) Uncle Renus and His Friends (Houghton 1900) Uncle Remus His books and His Sayings (Appleton 1906) A good modern edition is The Favorite Uncle Remus, edited by Oce go han Sant yourd and Archibald C Coolidge (Houghton 1919) Joel Chandler Harris Plantation Story teller by Alvan F Harlow (Mesoner 1911) is a biography for younger readers

HARRISBURG, PA The Capital of Pennsylvania began in the early 1700 s as an Indian trading post on the Susquehanna River Here early settlers oper ated a busy ferry as proneers pushed nestward through the Blue Mountains During the 1800 s Harry-burg flourished as a river port and then as a railroad center Today the city is still an important hub of transportation. Two railroads maintain large freight classification yards and seven national highways in

tersect here The city is served by the eastern section of the Pennsylvania Turnpike (see Pennsylvania) Several arrines call at its airport

Nearby coel and iron mines furnish Harrisburg with raw materials for its largest industry making steel Coal is available even at the city's doorsten. The Suequehanna washes tons of coal down from the moun tains to Harrisburg, where dredges pump it from the river bed. The largest steel rail mill in the country is here. Other industries are food processing printing and publishing and the manufacture of clothing

Capitol Park, the center of governmental activities contains the impressive group of state buildings Towering shove them is the green dome of the main capital I unding The State Capital was completed in 1906 Its bronze doors statuary mural decorations and stained glass windows are noteworthy features Other state buildings here are the Museum and the Furance Building The Forum a large civic auditori um is in the Education Building Beautiful River Park extends four rules along the river highway

In 1785 John Harris marked out the site for a vil lage he camed Harrisburg in honor of his father The elder Harns had established the first trading post here about 1712 Harrisburg became the state capital in 1812 and received its charter as a city in 1860 It adopted the commission form of government in 1913 Population (1950 census) 89 544

#### and Grandson of a PRESIDENT PRESIDENT

HARRISON, BENJAMIN (1833-1901) 'And grand father s hat fits Ben' was the refrain of one of the popular election songs of 1888, when Gen Benjamin Harrison of Indiana was elected president

The grandfather was Wilham Henry Harrison hero of Tippecanoe and president in 1841 The grandson Benjamin was a brigadier general of the Civil War, who became one of the ablest lawyers of Indiana and had been senator from that state, 1881-87

There was something of a mystery in the fact that Ben 18min Harrison was for any reason at all elected president of the United States He was not a 'hand-shaking' politi cian and had never been active as a party worker When he stood on a platform and ad

dressed a public audience he was one of the clearest and soundest speakers of his day The sudience forgot that he was short and unimpressive with a large head resting immediately upon his shoulders. They forgot that disrespectful reporters called him a

man ever had more loyal or

'pouter pigeon" They went away believing him to be a statesman But when he sat at a desk and dealt with men as individuals, his cold manner and seeming indifference often turned them against him Even when he granted men favors they went away dissatisfied His reserved manner and his refuctance to use dictatorial methods limited his influence with members of Congress and left the leadership of his party in other hands during his administration Yet no

devoted friends Election of 1588

Harrison was nominated by the Republicans in 1888 because the nominating conven tion was deadlorked by the attitude of James G Blaine who was the real leader of

the party Blame the nominee of 1884, had been beaten by Grover Cleveland and was unwilling to run again His friends stood out long hoping that be would reconsider When they had to give him up, they demanded a man who had few political enemies, whose private life was above any suspicion of reproach, and who could be expected to carry the doubtful states of Indiana and Ohio. Harrison met these tests. His family went hack to Benjamin Harrison, member of a distinguished colonial family of Virginia, who was active in the Continental Congress, a signer of the Declaration of Independence, and governor of his state. William Henry Harrison, long governor of

Indiana Territory and Indian fighter, had been elected president in the thrilling campaign of 1840. The name was well known.

Benjamin Harrison, with this family background, had lived a useful life. Educated in a log schoolhouse at North Bend, Ohio, and at Miami University (1852), he practised law in Indianapolis before he went to war in July 1862 as a second lieutenant. He served ably in Kentucky and Tennessee, took part in the march on Atlanta, and left the service as brigadier general, promoted for "ability and manifest energy and gallantry."

The election of 1888 turned sharply on the tariff issue, which had been rising in prominence since the campaign of 1880 (see Tariff). For years the Democrats had argued that a protective tariff was only a form of favoritism to a wealthy and sectional class, and President Cleveland had demanded a tariff for revenue only. The Republicans, on the other hand, insisted that prosperity in the United States depended upon the economic independence that

came from a protected system of manufactures. They carried the election in 1888, in spite of lukewarm interest in the Republican states of the West, where the voters thought the government protected the rich in the East and gave little thought to the farmers, and in spite of demands from workingmen that something ought to be done to ease their life and protect them in the uneven competition between the trusts and the workers.

Harrison was elected, and with him Levi P. Morton of New York as vice-president. Harrison won the majority of the electoral college (233 out of 401), but received fewer popular votes than did Cleveland, the Democratic candidate. The Republicans also carried both the Senate and the House, and were able in the next (the 51st) Congress to pass any party measures upon which they could agree. This was the Congress in which Speaker Thomas B. Reed won the title of "czar" because of his rulings to

increase the efficiency of the House and to frustrate such tactics of the minority opposition as the refusal to answer roll call and thus prevent a quorum.

The President soon discovered how difficult it was to perform his duties when he was not the real leader of his party. He chose the real leader, Blaine, to be secretary of state; and the latter resumed with exthusiasm the tasks he had started eight years before

ADMINISTRATION OF BENJAMIN HARRISON 1889-1893

James G. Blaine, Secretary
of State.

"Reed rules" adopted in the
House (1890).

McKinley Tariff Act, Sherman
Anti-Trust Act, Sherman Sil-

Anti-Trust Act, Sherman Silver Purchase and Coinage
Act passed (1890).

Pension expenditures greatly

increased.

North Dakota, South Dakota,
Montana, Washington, Wyoming, and Idaho admitted as states
(1889-90).

Territory of Oklahoma opened to settlement (1889). First Pan-American Conference held in Washington (1889-90).

Bering Sea controversy with Great
Britain settled (1893).
Controversies with Italy (Mafia
troubles), with Germany (over
Samoa), and with Chile.
Reciprocity treaties with Socie

Reciprocity treaties with Spain and Brazil. Annexation of Hawaii fails. People's Party (Populists) organ-

ized (1891).

Harrison defeated by Cleveland for re-election (1892).

under Garfield. Critics prophesied that Blaine would dominate the President, but their predictions for the most part were not fulfilled. Furthermore Blaine's frequent illness led Harrison to assume a considerable share of the work in State Department negotiations. The others in the cabinet were men of minor political importance. One, in the newest seat, was Jeremiah Rusl of Wisconsin, thrice governor there and always known as "Uncle Jerry," who was secretary of agriculture. Another was John Wanamaker of Philadelphia, head of a great department store and superintendent of a Sunday school, whose presence in politics and whose business were both good illustrations of the times.

Business Changes

John Wanamaker, as treasurer of the Republican campaign committee, had raised money, perhaps \$400,000, for the campaign fund, by persuading his manufacturing friends that if the Democrats won the election they would reduce the tariff, and the manufacturers would

lose their profits. Senator Matthew S. Quay, who managed the campaign, asked to have him made postmaster-general as a reward. This was done, and the Postoffice Department was the better for having a chief who was accustomed to biz business transactions. Wanamaker did not please the civil service reformers, but he helped to launch rural free delivery, which made life more comfortable for farmers in remote places. He also worked hard in favor of postal savings banks and parcel post, which came later.

Wanamaker was best known as a storekeeper. He, Marshall Field of Chicago, and Alexander T. Stewart of New York had devised and applied changes in retail trade that produced the modern department store. Among them they broke down the old motto of carest emptor ("let the buyer beware") which had always prevailed in business, and introduced the new practise of "money refunded," which has now become general. They gave a guarantee that their goods were

as represented. They adopted the principle of the fixed price with the pixel planity marked on every article and did away with the barter that had made shopping a rasky sport for buyers. They also gathered under one roof a multitude of different shops each at department in a great store instead of being a separate specially shop and by wholesale buying cut down their costs.

These men made huge fortunes for themselves their millions bulking large beside the estate of the bankers the railroad magnates and the manufacturers. They could not have grown and flourished except in the Harmon and Wanamaker were in office the Astor family which had built a palace on Fifth Area for Men York only a few years earlier tore down the home and creeted in its place the Astorns Hotel Son thas became the Waldorf Astorns and for a generation until it was replaced with the 102 stornes Rate Empire State Building in 1931 it remained the most creichysted hotel in the United States

The Fifty first Congress

In the 51st Congress there was much work to be done for there had not been a government under the complete control of one party for many years First



The development of rapid t and t in 1875s of the agr ag two 1970 touch by magnetic blood electric ly had taken the place of steat that street and elevated railways. He case view of the New York Elevated in 1890 before electric ly had taken the place of steat

great cities But there were then in 1890 three cities of over a million each New York Chiesgo and Philadelphia and one-third of the people of the United battes were living in cities of 8 000 or more

street rail vay corporations
'The Increase in Luxury

John Wannmaker wa one of the nels who combined the accumulation of miles of the nels who combined the accumulation of miles of the new millionarcs were need to be settled to the leave the new miles are trained. The lavables of life mercased with more money to spend and more futurers to buy. The cuttes grew more elegant better paved better lighted magnificent hotels became temporary homes for the and those who washed to appear neb. While

of all was the tand which the Republicans had promised to raise on as to protect any industry that needed protection. William McKinley son and grand son of Ohos rose manufacturers gave him an ea to the bill that, was passed in the a titum; of 1850. There were common untiterings against this I lim Republican states in the West. To sidence these protects as one reason for passing the Sherman Anti Trust. Law (1890) which forbade the thuist to carry on interstate a commerce of they were proved to be consuprated in restraint of trade. This act was never completely effective nor was it popular with the hussies sinter easts which controlled the party that passed it but it was a matter of political necessity.

Another act of similar neess by was the Sherman Silver Purchase Act (1890) occarrened by the farmer demand for rel of from low prices and high money During the decade following the Bland Allison Act (1878) the general prosperity was so widespread that

Greinhackers and free-sliver advocates had been reduced in numbers. But during the late 80 s crops were poor in the Far West and South and by 1800 framers were again demanding chesp money (see Money). Their leaders persuaded them that a congravey of banks and take its price and that this money can be suffered to the suppose of the superior of commodities a combination that made

it hard to pay debts. They claimed that the "crime of 1873" which dropped the silver dollar from the They now free-coinage list was part of the plot. demanded relief. The Sherman Silver Purchase Act (1890) required the Treasury to buy each month 4,500,000 ources of silver bullion, and issue in pay-

ment therefor Treasury notes, which were themselves redeemable either in gold or silver at the option of the government. Harrison signed the law unwillingly. It failed to accomplish the desired purpose, for the price of silver bullion continued on its downward path.

In November 1890, by a huge landslide, the Democrats gained control of the 52d Congress, that was to sit from 1891 to 1893. Of deep influence in weakening the Treasury was a new pension law for Civil War veterans, that no longer required the pensioner to show disability suffered in the service. Need for help was enough, and the pension list rose to more than 1,000,000 names.

Harrison's strange gift for unpopularity weakened his administration by lessening the lovalty of Republican politicians to him. Approaching hard times and discontent in the West made his last two years in office unproductive.

## Foreign Affairs

Blaine, in charge of the State Department, carried on a vigorous and distinguished administration. In his

earlier term under Garfield, he had sought the cooperation of all of the American republics for their common advantage, and had issued invitations for a conference to be held in Washington. President Arthur had recalled these invitations, but they were now re-issued, and Blaine presided over the first Pan-American Conference in 1889-90. The Pan-American Union was a result of this. and a beautiful building in Washington, the gift of Andrew Carnegie, was later made its home.

There were other exciting diplomatic episodes that in three cases brought the United States near the verge of war. One was with Germany, one with Chile, and one with Harrison with business interests. The first concerned the status of the Samoan Islands in the Pacific, in which the United States, Great Britain, and Germany had commercial interests. For 30 years the islands had been disturbed by the struggles of native chiefs for the throne. In 1888 Mataafa, with British support, was elected king in opposition to Tamasese, who was supported by German interests. The three

countries involved sent their warships to the islands. and only a hurricane, which sank three American and two German warships with great loss of life, prevented hostilities. Instead of fighting, the American seamen struggled to rescue the shipwrecked Germans and the matter was patched up. The three powers from

1890 to 1900 jointly controlled the islands under a protectorate.

The trouble with Chile was due to an attack upon seamen from the U.S.S. Baltimore in the streets of Valparaiso in 1891. Both sides were to blame, but the United States demanded and received apologies under threat of war. With Italy the matter worked the other way. A mob in New Orleans in 1891 lynched several Italian subjects. The city had been intimidated by members of an Italian secret society, the Mafia. but the local jury had failed to convict them. Italy demanded at once that the United States punish the leaders of the mob. and withdrew the Italian minister from Washington in protest. Secretary Blaine had the

difficult task of explaining that under the American system the prosecution of criminals was a matter within the control of the state in which the crime occurred; that the United States government could not punish for such crimes; and that it could not even guarantee that the state would be vigorous in its

prosecution of them. In the end the United States paid \$25,000 to each of the families

of the lynched Italians.

The aggressive national policy which Blaine pursued led him to try to protect the seals of Bering Sea from extermination at the hands of the seal hunters. Sealskin coats were fashionable, and the hunters received high prices for the pelts. Blaine declared that the Bering Sea. nearly closed by Alaska and the islands belonging to the United States, was mare clausum (closed sea) to other powers. The United States had always denied the claim of any other country to own the ocean. and Great Britain now denied this claim of the United States. The matter was submitted to a special court of

arbitration (1893); the court decided that legally the sea was open, and the United States could control only the "territorial waters," three miles off shore; but as a matter of equity the court restricted seal fishing (see Seal).

The general business of the State Department in these years had much to do with the rights of aliens who, having been naturalized in the United States,



Harrison's secretary of state, a vig-orous fighter for American rights.

JOHN SHERMAN



returned to their old homes and found that their mother countries would not always treat them as citizens of the United States This problem was especially vevatious in the relations with Germany, France, and Italy, from which many men came to the United States in order to escape the military service which those nations required of all their extinens. In Hayes' and Garfield's administrations many Insh had sequired American citizen-hip, and had then returned to Ireland to oppose English rule There were, also, matters connected with the growing expert trade of the United States, and the desire of European countnes to exclude food from America. Meats were often excluded Buffalo Bill, on tour with his Wild West Show, once found that he could not get his buffaloes into Germany because of a law forbidding the entry of 'live cattle "

In 1892, Blume suddenly resigned as secretary of state, three days before the Republican previdential convention. His candidacy for the nomination was not pushed, however, and Harrison was renominated, only to be defeated by Grover Cleveland In the last months of the administration there were fears that before Harrison lift office a financial pagic would

break over the country The Sherman Silver Purchase Law was flooding the Treasury with cheap silver. and confidence in the maintenance of the gold stand ard of money was lessening The heavy investments and waste of the last decade had used up much of the free capital of the United States The new railroads had brought into the markets so much wheat and cotton that it no longer paid to raise either Farmers were even more discontented than they had been in 1890, and a new farmer party, the Populists, made its appearance with a candidate of its own, Gen James B Weaver The panic was luckily for Harrison, deferred until 1893

At the end of his term Harrison returned to Indiana poles where he resumed the practise of law and steadily enhanced his fame as a lawyer. In 1898 he represented Venezuela in the arbitration of a boundary dispute with Great Britain. He was a delegate of the United States at the Hague Peace Conference ln 1899 Two years later, March 13, 1901, he died He wrote many articles for magazines, and published (1897) This Country of Ours', an account of the operation of the United States government, Views of an Ex President' was published after his death

## The INDIAN FIGHTER Who Became PRESIDENT

HARRISON, WILLIAM HENRY (1773-1841) If the frontier creates the characteristics which are peculiarly American, as has often been asserted, then William Henry Harmson was a typical American, for most of his public career was spent in the frontier wilderness of the Northwest Territory, or representing that region in Washington But by birth and education General Harrison belonged to the arm tocracy of Virginia His father was a plantation owner in the tidewater region, who had taken a prominent part in Virginian politics during the Revolutionary War, and had signed the Declaration of Independence After placing his signature to that immortal document, it is said that he remarked to Benjamin Franklin, "Now we must all hang together." 'Certainly,"

replied Franklin with a smile "We must all bong together, or assuredly we shall all hang separately As William Henry was the third son of the Harrison family, and the father's property would under the

Virginia law of that time go chiefly to the eldest son, a profession was necessary for him His father sent hun to Hampden-Sidney College, Va , 1787 to 1790, and then to Philadelphia to study medicine But the young man disliked this calling, and at the death of



WILLIAM B. HARRISON

his father, in 1791, he dropped it President Washington then appointed him an engin in the ATTOV

Harrison's first active duty was under Gen Anthony Wayne, in the campaign in the Ohio country against the Indians He served with distinction in the battle of Fallen Timbers in 1794, and then was commander of Fort Washington, at Cincinnate, until 1798

WhilegainsonedatFortWashington, he married Anna Symmes. whose father, Judge Cleves Symmes, was engaged in bringlog columnts to his yast Miami Purchase between the Miami and Little Miami rivers

Made Governor of Indiana Territory

In 1798 Captain Harrison (as he had then become) resigned his commission and settled on a

tract of land at North Bend, about 16 miles from Cincannata That same year President Adams appointed ham secretary of the Northwest Territory under Gen. Arthur St Clair as governor This was the beginning of his long official connection with the Territory He served as its first delegate to Congress Then when it was divided into the two territories of Ohio and Indiana in 1800, he was appointed governor of Indians Territory, and acted also as superintendent of

Indian affairs. He was the first territorial delegate from any territory in the United States Congress. As such he rendered an important service to the people in obtaining a change in the land policy of the government, so that the public land was no longer sold in vast tracts to the wealthy, but in tracts small enough for the poorer settlers to purchase.

How He Won the Title of "Old Tippecanoe"

As superintendent of Indian affairs he made in all 13 treaties with the Indians, securing the cession of large sections of land in the Northwest. Tecumseh, a chieftain of the Shawnee Indians, and his brother the"Prophet" objected to this giving up of the Indian lands, and claimed that the consent of all the tribes was necessary before the cession could be valid. The chiefs, they said, had "no right to barter away the land for a pewter ring or a keg of liquor. The result was a formidable Indian War, in which Governor Harrison defeated the Indians at Tippecanoe, near Lafayette, Ind. (Nov. 6-7, 1811). This victory made Harrison a national hero, and he was admiringly called "Old Tippecanoe." (See Tecumseh.)

In the War of 1812, Harrison with the rank of major-general was in supreme command of the forces in the Northwest. He urged the construction of a fleet on the Great Lakes, and, after the victory of Commodore Perry on Lake Erie, Harrison crossed into Canada. In the Battle of the Thames (Oct. 5. 1813) he defeated the British and put an end to the war in Upper Canada.

Because of difficulties with the secretary of war, General Harrison resigned his commission in 1814. In the following years his admiring fellow-citizens sent him to the United States Congress and to the Ohio State Senate, and in 1828 he was appointed minister to Colombia. But within a year he was recalled from the latter position and retired to his farm near North Bend.

His Nomination for the Presidency

In 1836 General Harrison was nominated by the Whigs for the presidency, and though defeated by Van Buren, he succeeded in carrying seven states. In 1840 Harrison was again the Whig candidate against Van Buren, who was seeking reelection. The campaign of that year marked a new era in American politics. With it began the monster meetings, the carnival pomp, and the doggerel verse which for years after marked presidential elections. One part of Harrison's residence at North Bend was a log cabin covered with clapboards; and at the opening of the campaign one of his admirers said that his table, instead of being served with expensive wines, was supplied with cider. So "log-cabins and hard cider" immediately appeared at all the Harrison meetings. The cry "Tippecanoe and Tyler too" carried the Whigs to overwhelming victory, making Harrison president and Tyler, vice-president. (See Tyler, John.)

But the strain of the campaign, and of dealing with the multitude of office-seekers in the months that

followed proved too much for General Harrison's strength. Although in apparent good health at the time of his inauguration, he soon fell ill of pneumonia and died on April 4, 1841—just one month after he took office. He was the ninth to hold the presidential office, and the first to die during his official term.

It is useless to speculate as to what sort of a preident he would have made. On the one side are those who hold that "he was not a great man, though he lived in a great time, and he had been a leader in great things." On the other hand, it is pointed out that he was one of the best territorial governors ever appointed in the United States; and that there is no reason for thinking he would not have shown ca the national stage the same qualities of broad-mindedness, integrity, tact, courage, and resourcefulness that he had displayed in the lesser drama of the frontier.

HARTE, FRANCIS BRETT (1836-1902). When Francis Brett Harte, best known as Bret Harte, put the spirit of the lawless, burly life of early California miring camps into stories, he started the American story of local color and atmosphere, which sprang into instant popularity. Though born in Albany, N. Y., he knew the life he wrote about; he had lived in California from the time he was 18, teaching, mining, and setting type. While he was at work in a San Franciso newspaper office he wrote the first of his sketches and was at once promoted to the editorial staff. He became editor of The Overland Monthly, in 1868. and contributed to it 'The Luck of Roaring Camp' and 'The Outcasts of Poker Flat', the most famous of his stories of rough western life. Harte had a talent, too, for humorous verse, and the nation laughed at his 'Heathen Chinee', the Chinaman with the "smile that was childlike and bland." who turned the tables on two white men who tried to cheat him at cards:

Which is why I remark, And my language is plain, says Truthful James, who tells the story-That for ways that are dark And for tricks that are vain, The Heathen Chinee is peculiar.

Bret Harte's fame had spread so far, meanwhile that the Allantic Monthly asked him to write for it alone. He went east in 1871, lectured awhile 63 California life, then was sent as consul to Creied in Germany, and later to Glasgow, Scotland. His best years, after 1885, were spent in England, where he died. He was the author of many other short stores and one long novel. but his first stories remained the best. He wrote some serious poems, too, of which cetain ones deserve a wider reading than they receive

Bret Harte's chief works are: Stories: The Luci of Roaring Camp' (1868); 'The Outcasts of Poker Flat' (1869); The Twins of Table Mountain' (1879); 'In the Carquinez Woods' (1883); 'A Phyllis of the Sierras' (1888). Novel: 'Gabriel Conroy' (1876). Poems: 'The Heathen Chinee' (1870); East and West Poems' (1871); 'Echoes of the Foothills' (1874).

HARTORD CONN Business foresight and an advantageous situation have combined to make Hartford one of the chief cities of New England Time and again new funds of businesses have been developed to meet changing economic conditions. The capital and largest city of Connectuut it is now known as the Insurance City. More than 45 insurance firms have headquarters here and the towering offices of the largest companies dominate the sky line

Standing at the head of navigation on the Connect cut River Hartford was important in colonial days as the trade center of the fertile valley. With the growth of ocean commerce it became a shipping port and its bankers wrote marine insurance. When shipping was cuppled by the War of 1812 new companies were

formed to write other types of insurance
Hartford was also quick to take up manufacturing

narrord was also quice, to case up monascenting and produced goods for the farmed. Yankee pedders When the nation turned to large scale manufacturing Hartford s & lide artisans made it a center for making tools and machinery. Today with its suburbs East Hartford and West Hartford it also makes air planes explane parts firearms brushes alectical equipment tyrearities and other products. It is

marks the historic spot
Hartford become the capital of the Connecticut
Colony in 1665 It was the joint cap tal with New
Haven beginning in 1701 The leg slatura met after
nately in the two towns until 1875 when Hartford

became the sole state capital A distingu shed show place is the Old State House built in 1796 On Capitol Hill are several impressive state buildings. Other notable buildings are Wads worth Atheneum Avery Museum Trusty Chilege and Hartford Seminary Foundation The Colt Memorial Museum honors the firearms pioneers and the Mor gan Memorial the J Pierpont Morgan family Other famous residents of the past melude Nosh Webster and Mark Twain Hartford adopted city manager gov ernment in 1948 Population (1950 census) 177 397 HARVEY WILLIAM (1578-1657) The man whn dis covered how the blood circulates was William Harvey an English physician Before Harvey's time doctors actually knew little of physiology the science that deals with the functions of the body Harvey's discovery was the most important m the whole history of this science. His careful research laid the founds tion for our present-day knowledge of the subject

Uon for our present-day gnowledge.

William Harvey was born April I 1578 in FolkeStone Kent England He was the second of eight



Harvey (standing) shows King Charles I s detail from an ex perimental dissection of a deer Charles was keenly interested in Harvey's researches and did much to encourage him.

chiliren At ten he was sent to the King s School in Cunterbury at 16 he entered Cambridge University where he spent four years. When he reached young manhood he was short dark and quich tempered After he was graduated from Cambridge Harvey

became a student at the medical school in Padus Italy the finest such school of its time. One of the transparent is a standard and its time. One of the transparent is a standard viscover and analorous Fabricus noted surgeon and analorous Fabricus had already discovering the property of the property of

m his honor. The Linker is still there Although Harvey had an M D degree from Padue he wanted one from an English school as well. A few months at Cambridge were sufficient to qualify him for this second degree. He started a medical practice in London and in 1604 he married F izabeth Browne daughter of a former phys c an to Queen Einzeberh I Harvey row en polly in his profession? At the same t me be quiedly continued he research in the problems of the heart and the cruedatory system.

In 1616 Harvey was asked to give three lectures to the College of Phys cans (a group corresponding to a modern medical society) At this time doctors gen erally believed that the blond ebbed and flowed in the arteries and veins they did not suspect that it erculated in a continuous route Harvey gave a nearly complete and very accurate account of the circulatory system (see Heart and Circulation) Because microscopes had not yet been invented he had no way of seeing the tiny capillar es and the part they play in transferring blood from the arteries to the ve as Hawever he realized that some such means must exist for the transfer II s work received wide acceptance when his lectures were published in 1628 under a Latin title translated as On the Motion of the Heart and Blood in Animals

In 1618 Harvey was appointed physician extraordinary (ranking below the physician in ordinary, or regular physician) to King James I. When King Charles I succeeded his father, Harvey became his physician in ordinary. Charles took a personal interest in Harvey's researches in circulation and in growth, and he provided the physician with animals for experimentation. Harvey went into retirement when Oliver Cromwell became master of England. He died June 3, 1657.

HARZ (hārts) MOUNTAINS. Many quaint old towns and ruins of medieval castles still stand in the beautiful Harz Mountains in central Germany. The mountain group rises abruptly between the Elbe and Weser rivers and runs northwest for about 60 miles. Nowhere is it more than 20 miles wide. The granite crests are barren, but the lower slopes are green with pine, fir, and beech. In both summer and winter the Harz is a popular tourist resort.

The highest peak is the Brocken, a mammoth domeshaped mass of granite 3,747 feet high. Since pagan times a spring festival, called Walpurgis Night, has been held on this peak. According to German legend, witches riding broomsticks gather here on the night of April 30 and dance until dawn around a bonfire lit before the Teufelskanzel (Devil's Pulpit). Walpurgis Night is described in Goethe's poem 'Faust'.

Harz mines have been worked since the Middle Ages. Some copper ore and other minerals are still extracted. Other industries are stock raising and manufactures based on the forests—chiefly paper, matches, and furniture. Many people breed the famed Harz Mountain canaries and teach them to sing.

HASTINGS, WARREN (1732-1818). After Robert Clive had laid the foundations of British power in India, Warren Hastings became India's first governor general. It was mainly owing to Hastings' rare administrative skill that Britain was able to retain India.

Born in 1732, Hastings was early left an orphan in the care of an uncle. After attending Westminster School in London, he was given a clerkship with the East India Company and arrived in Calcutta at the age of 18. Clive recognized the young man's abilities, and before he left India he made Hastings agent for the East India Company in the court of an Indian prince, the Nawab of Bengal. Later Hastings served the Company in Madras. In 1772 the Company recalled him to Calcutta as governor of Bengal. Hastings found the administration in confusion and the Company in debt. At once he began a series of reforms.

The East India Company was originally a mere trading corporation that governed only its own trading posts. Clive had extended the rule of the Company from Calcutta over all Bengal, a vast continental area (see Clive). The British government saw the necessity of exercising stricter supervision over a corporation that was collecting taxes, maintaining armies, and exacting large sums of money from Indian princes as payment for giving them protection. In 1773 Parliament appointed Hastings governor general of all the Company's possessions in India.

During the American Revolution, France went to war with England in support of the American Colonies. The war spread to India, from which the French had been trying to expel the British. French officials plotted with Indian rulers and French officers drilled Indian troops. Hastings struck in all directions and struck hard. One army was despatched across the peninsula to Madras, where Hyder Ali, the Mohammedan sultan of Mysore, was laying waste the land. India was saved for the British; but the wars cost money. To pay for them, Hastings exacted increased tribute from the Rajah of Benares and the Nawab of Oudh and also forced the Nawab's mother, the Begum

of Oudh, to surrender some of her enormous treasure. Hastings had to struggle to uphold his authority against a faction in his own governing council. This faction was led by his personal enemy, Sir Philip Francis, whom Hastings had seriously wounded in a ducl. When Hastings returned to England, in 1785, Francis, then a member of Parliament, denounced him for corruption and cruelty. The orator Edmund Burke and the playwright Richard Sheridan took the lead in demanding Hastings' impeachment. The trial opened in the House of Lords in 1788 and dragged on for seven years. Hastings was finally acquitted, but the expense of the trial had used up his savings, and the East India Company had to come to his aid. He died in 1818, mourned by many Indian and English ad-

ed, he had put the administration of India on a more honest basis than it had ever been.

HASTINGS, BATTLE OF (1066). The Norman Conquest, which brought tremendous changes to England, began with the decisive battle of Hastings, Oct. 14, 1066. Harold II, last of the Saxon kings of England, was killed in this battle. On Christmas Day, William, duke of Normandy, was crowned king. He is known in history as William the Conqueror.

mirers. While his methods were sometimes high-hand-

After long preparations, William set sail from Normandy. On September 28 he landed his army at Pevensey Bay, on the English Channel. Harold hastened down from the north of England with his army. On October 13 he took up a strong position on a hill between the port of Hastings and the present-day village of Battle. At dawn the next day William roused his troops and set out on an eight-mile march to join battle before Harold's troops were rested. At nine o'clock the two armies clashed.

All day the battle raged. Norman horsemen pressed up the hill. The English fought on foot. Standing close together, protected by great shields, they wielded their long-handled battle-axes with terrible effect. Toward evening the English ranks broke. Then Norman archers, in the rear, shooting high, showered them with arrows. Harold was mortally wounded by an arrow that pierced his eye. His two brothers were already slain. The rest of the English army fled. (See English History; William I; Harold II.)

Hastings, which gave its name to the battle, is now a thriving Sussex town and seaside resort. Population (1951 census, preliminary), 65,506.

## The Story of HATS and HOW THEY ARE MADE

What Endless Variety in the Headgear of Different Peoples'—The History and Geography of Hats—A Visit to a Felt Hat Factory—Why Panamas Cost So Much—Why Men Lift Their Hats to Women

HATS AND CAPS If we could assemble specimens of the headgear of every land and age on one gigantic hat rack, what an amusing and interesting sight it would make! The fur hood of the Eskimo would stand beside the Meucan's high peaked hat and between the glossy silk hat of civilization and the huge umbrella like straw hat of the Burmese would glow the turban of the Mohammedan and the bright bonnet of the Scotch Highlander The coneshaped hats of the early Aegran civilization-4 000 years ago-and the tall cylindrical headgear of the Hittite kings and queens would present a fascinating contrast to the cocked hat of Washington's time and the cowboy hat of the western plans. The stuffy wired cap of the Norwegian hride would be there, and the round beaver fur hat, lined with red satin and adorned with a diamond clasp, that Charles VII of France were when he made his trumphal entry into

the city of Rouen in 1449. Why such a marvelous variety of forms? Partly to serve particular needs, partly just for ornament In regions of great heat or intense cold protection is the first purpose of head covering but in the civilized countries of the temperate zone where it is rarely excessively hot, cold, or wet hats vary greatly in shape size, and material Bright colors are common. hats are designed, to a great extent, for decoration, and fashion determines the materials. These ma tenals are gathered from all over the world - straw from the Philippines, Italy, and Japan rabbit fur for felt from Australia and central Europe, salk from Chma, Italy, and Japan, fancy furs and feathers from a score of lands In countries not so advanced where there is little foreign commerce, the materials used for clothing must be those close at hand, and a headdress once adopted 15 used for centuries

In the western world men's hats change from season to season in more details of shape and training but the principal types have remained the standard for many years—the straw hat, the alk hat and the stift hat of drily. Beside these there are the popular cloth hats, made of wooden or cotton faires, stiffned by many ross of sticking and sometimes by shellic. Caps also are largely worn for in formal west.

How Felt Hats are Made

If ever you get the chance, vant one of our great felt-hat factories and see how your derby or soft hat has grown out of a few scrape of fur from an annual that once scampered over the plans of Australia. Argentuns or Canada For the finer grades fur alone is used, but cheaper hats are made from a mixture of wool and fur or wool alone. The first step is to clean and brush the fur while it is still on the skim and "carrot" thy brushing on nitrate of mercury to make it felt more easily. Then a machine shears off the fur which passes on an endless belt to blowing machines. In these the soft fluff is torn spart by sicel teeth and freed from hairs or foreign material.

Now begans the transformation into a hat The exact amount of fur needed to make one hat is passed to a boxed in machine, which contains a minutely periorated copper cone about three feet high As this cone revolves myriads of the mustlike fur particles are drawn by suction to its damp outer side, forming a thin covering of felt. A wet cloth is thrown over this matted fur, another cone is pressed over it, and the whole is immersed in a tank of hot water until it felts under the pressure The delicate cone of felted cloth is then shrunk to the proper size, dyed, and given a bath of shellac to stiffen it-weak shellag for soft hats, and a denser solution for stiff hats The cone is now plunged in boiling water and flattened at the frown so that it begins to take on the appearance of a hat It is stretched, blocked, and pulled with the aud of hot water, steam and ingenious machinery until it has taken the desired form Stiff hats are put in a hydraulie press to increase their rigidity, and the hrim as curled by being pressed on a flange by a bag of hot sand The rough surface is smoothed by rubbing with emery paper, the trimming is put on, and last of all the leather sweat-hand attached—and the hat is ready

Straw hats are made from high grade imported straw. The braids, every for some expensive hats, are seved and pressed tuto shape by machinery, after being garde with waterproft gum. Panama hats are made from a fine, high. "straw" obtained from the exvess of sature (hypupper, of repostall) that growschedy in Denote, though it is also found in Colombia and for each are most to complete, more the fibers mustface or are months to complete, more the fibers mustbal-spit throughly mostered and the weaving is done only in the last twelght or early dawn.

Straw and Panama Hats

In the manufacture of silk hats several layers of cotton material are cemented together with shellac This "body is pressed into shape on a block, and the pm is cemented to it. Then it is coated with shellac, covered with silk plush, trimmed, and finished

Hat manufacturing is an important industry Connecticut is the leading state in the manufacture of men a felt hats. Now salk and Danbury are its largest centers. Missouri leads all states in making men's straw hist. Men a cloth caps are made in New York. City which is also the largest nomen's millinery center. STORY OF THE LITTLE BOW

The little bows inside men's hat bands are relies of the drawstring used in olden days to make hats fit.

Women's hats are made in factories, wholesale workrooms, and—the more expensive ones—in small shops which sell direct to the customer. These factories and shops buy "hat bodies," usually made of felt or straw, which have already been cut on a hat form, and these are shaped, blocked, and trimmed. Styles in women's hats are ever changing, chiefly under the influence of Parisian designers.

Some Curious Facts about Hats

Did you ever notice the tiny bow that decorates the lining or inner band of most hats, both men's and women's? Not so very long ago, hats were made in only a few sizes, and a drawstring was inserted in the lining, which was tightened or loosened to fit the head. The little bow is a relic of that old practice, although it also serves the purpose of marking the back of the hat. Nearly all these bows are made in Geneva, Switzerland.

The ancient Greeks, when traveling, protected their heads with a flat, broad-brimmed hat of felt

which tied under the chin and hung down the back when not needed, like a sunbonnet of today. These tie strings are still preserved in the streamers around the crown of a child's sailor hat.

During the 14th and 15th centuries, women's hats, caps, and hoods were of the most extravagant shapes and sizes. Some were horned, others were great peaks, like the "dunce-cap," from a

peaks, like the "dunce-cap," from a foot to three feet in height. Sometimes a veil would be draped over these towering structures, falling the length of the dress.

Hats have often had an important place in distinguishing sects and parties. The Puritan wore his

severe high-crowned hat over his cropped head as a rebuke to the cavalier of the time, with his hair in curls, and a great sweeping plume on his low-crowned hat. The Quaker affected a broadbrimmed gray hat (still to be seen in some conservative communities) which he refused to doff to any man—only to his Maker. In the Roman



The old Egyptians were a band to keep their hair in place. We have kept the band but put it on the outside of our bats.

Catholic and Anglican churches hats and other forms of headgear have a conspicuous place in the differences of costumes which distinguish various ranks and orders of the clergy. During the greater part of the 18th century, two rival political parties in Sweden, known as "Hats" and "Caps," were in constant struggle, the "Hats" representing the nobles, and the "Caps" being the party of the common people. These names were slogans in some bitter battles.

In the English House of Commons members may wear their hats while seated, but take them off when they rise to speak. But in one special case—after a debate has been closed and a vote ordered, but

before it is actually taken—a member who wishes to raise a point of order must speak seated and with his hat on. The great Gladstone once ran foul of this custom. He had wandered away from his seat bareheaded, and wished to speak on a point of order as a vote was about to be taken.



Streamers on hats are reminiers of the tie strings on the ancient Greek traveling hats

"Hat! hat! hat!" cried the members in riotous glee as he started to speak. A nearby member lent him a hat, but it was several sizes too small for Glad-

was several sizes too small for Gizestone's massive head. With this perched ridiculously atop his head, the "Grand Old Man" was allowed to proceed. This incident illustrates only one of many points of etiquette regarding the hat in the House of Commons. The session is dismissed when the Speaker (the presiding officer) rises and puts on his hat.

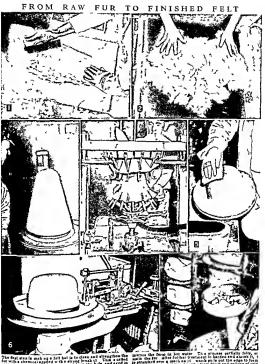
Formerly inferiors were required to uncover in the presence of superiors

as a mark of respect. Today this custom survive chiefly in the custom of removing the hat in the presence of royalty and other distinguished persons, and of raising it to ladies while out of doors.

HAVANA, CUBA. A blinding tropical sun beats down upon the narrow white pavements, palm-fringed baseball park, glaring marble palaces, modern office buildings, old gray churches, and gay-colored Spanish houses of Cuba's capital. It blazes upon the concrete docks and forests of masts along its teeming water front, and brightens its background amphitheater of palm-fringed hills.

This is Havana—a city that has truly been called "Spain with a modern American virility, tinged with a generous dash of the tropics." It is, on the one hand, a quaint city of plazas, bazaars, cafés, and lottery, cigar, and wine shops; a city where the boom of ancient cathedral bells mingles with the clang of cart bells and the cries of street vendors as they press their way in and out of old market places piled high with tropical fruit, vegetables, and many-colored fish, and wander down cobbled lanes here and there topped with canvas canopies and edged everywhere by one-story plaster-faced houses with balconies, flat roofs, jutting iron-barred windows, and arched doors leading to dim patios or courts.

On the other hand, Havana is curiously modern, with a distinct American flavor. Baseball is now a well-accepted substitute for bull fights and a pretext



The fig. step is make age full had in to deten and strategies that with a chancel speak or the strong bright of th

for as much betting; "jitney" automobiles, which are for hire everywhere, compete with clanging street-cars in mad rushes up and down the narrow old streets. The uniform of the khakied Cuban soldier is American and so too are the bill-boards, the electric signs, and the mail boxes. At all points there is thus a curious dovetailing of the old and the new. Office buildings, theaters, hotels, and clubs shoulder crumbled Spanish by mansions of the planter aristocracy, for its publigardens, university, and its drives—such as the beautiful Prado, with its double row of laurels and other shade trees and graceful palms running along a parkway in its middle; a city noted for its old cathedral dating back to 1724, where until 1898 the body of Columbus was thought to have rested; for the picturesque old forts of Morro Castle, La Cabana, and

# LOOKING DOWN THE PRADO IN HAVANA



Cuba is very proud of her beautiful new \$15,000,000 capitol building at Havana, which was formally opened at the second insequation of President Machado. We can see the splendid gold dome of the new capitol in the picture above, as we look down the Prado, finest street in Havana. This street begins at Punto Casile, and follows the line of the old city wall to the Parce & Colon. It is lined with handsome buildings made chiefly from the limestone which underlies the island. The buildings rarely rus above three stories, and their upper stories project over the side and the color called a subject over the side and the color of the color of the side and their called a subject over the side and the color of the side and the color of the side and their called a subject over the side and the subject over the side and their called a subject over the side above three stories, and their upper stories project over the sidewalk, forming shady galleries.

churches; the latest factory products are found in quaint old-time markets; modern ferries chug across the harbor beside queer old row-boats with awnings at the rear; old convents have been transformed into post-offices and homes of warehouse brokers and customs officers.

Havana is the largest and most important commercial city in the West Indies, a city of busy factories, banks, and stores of all description. Its railways shoot out to every important island center. At its doors is one of the safest harbors of the world, where 4,000 ships enter every year flying flags of many nations and laden with cargoes from the United States, Spain, and South America. These same ocean-going vessels then fill their holds with cigars, tobacco, and sugar, three-fourths of which goes to the United States. Havana possesses some of the largest cigar and tobacco factories in the world, although she makes other things, too, such as boxes, barrels, wagons, and carriages.

And last of all there is the Havana that the tourists so admire, the city famous for its promenades edged

Punto Castle, that guard the entrance to its harbor; for the Governor's fine palace; and for the many seaside resorts near by.

In the older parts, Havana is still rather neglected looking, although it is much cleaner and more santtary than it was before the United States military occupation in 1898, when the Americans helped to clean it up and eradicate its yellow fever. The newer portions of the city are modern, picturesque, and well laid out.

Havana is situated on the north coast of Cuba 02 a sort of peninsula between the Gulf of Mexico and the land-locked harbor. It was founded by Velasquez in 1519. It remained the chief city of the Spanish power in the West Indies till near the end of the 19th century. In February 1898 the United States battle ship Maine was blown up in its harbor, and during the Spanish-American War that followed, the city was blockaded by the United States fleet. With the emancipation of Cuba from Spanish rule, Havans became the capital of the new republic. Population (1953 census), 787,448.

HAVRE (dv'r) FRANCE The second largest port in France Havre is called the seaport of Paris It is 108 miles northwest of the crintal at the mouth of the river Seme The French call it Le Haure (the harbor) It was only a fishing hamlet until 1516 when Francis I fortified it and began the construction of the harbor

After the first World War a plan for harbor development was undertaken including the huilding of a gigantic breakwater across the entrance channel to form a new great outer harbor and to serve also as point of annual and departure for scaplanes Enormous

new warehouses were built. A large bas n was con structed in the outer harbor to take care of the petroleum trale and huge storage tanks were provided These and other improvements made Havre one of the world's largest and finest harbors. In the second World War Havre was blasted from air and sea The neople lost almost everything After the war the European Recovery Program launched by the United States helped the French to rebuild the city The business section rose in concrete and steel Hayre now specializes in making lace and chemicals and building ships Population (1946 census) 10a 491

## AMERICA'S Rich, Beautiful ISLANDS in the PACIFIC



sand and a coral reef offshore breaks the Pacific's waves into pleasant rolling surf Beyond rises rogged Diamond Head

HAWAIIAN ISLANDS Eght beautiful tropical islands for out in the Pacific Ocean may become the 49th state in the Union The Hawanan Islands have been a territory of the United States since 1900 Since the second World War the r citizens have been making a vigorous campaign in Congress for state hood and self government

In 1947 and again in 1950 the United States House of Representatives passed bills to make the territory a state but these bils did not reach a vote in the Senate In 1950 the people adopted a model constitu tion for a state of Hana i

in a new move toward statehood

Advocates of statehood say that Hawan has all the requirements. Its population is greater than that of most territories when they became states It is larger in area than

three of the states and pays more federal taxes than ten of them. To the argument that it is too far from the national capital leaders reply that fast air and sea transportation have brought it closer to Washing ton D C in travel time than California was when it entered the Umon

The group of eight principal islands of the volcanic Hawanin Archipelago lies between 2 100 and 2 500 nautical m les from the west coast of the United States It curves 400 miles southeast to northwest just south of the Tropic of Cancer An additional chain of volcanic islets.

rocks reefs and shools arches 1 000 nautical miles further northwestward Pacific Paradles

and Crossroads

Famed for beauty of mountain and shore and for year round sum mer chmate the islands

have been termed the Paradise of the Pacific. So huge is the host of visitors they attract that entertaining them has been called the islands third industry. Growing and processing sugar cane and pineapple are the first and second largest sources of wealth.

The islands are the only considerable mass of land in the middle Pacific north of the equator. They provide a valuable crossroad for air and ocean traffic between American and the leading harbors of Asia and Australia.

Their strategic location was tragically affirmed on Pearl Harbor Day, Dec 7, 1941. On that historic morning the Japanese opened war on the United States. With an air and submarine attack on the Pearl Harbor naval base Japan dealt a crippling blow to the fleet guarding America's coast (see World War, Second).

The war proved Hawau's importance as a defense base. As the United States took the offensive, the islands became the great center through which men and supplies poured out to Pacific battlefronts. Army, air. and naval installations were strengthened and increased. The islands became a gigantic training area. When fighting broke out in Korea in 1950, troops and munitions again passed through the is-

lands; and the wounded were flown there for rest and treatment en route to the United States.

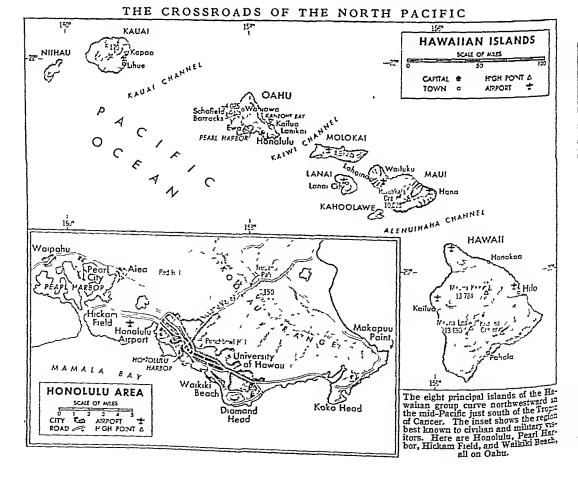
Surface and Climate

The Hawaiian Islands are the eroded tops of great volcanoes. They were thrust upward through a huge rift in the bottom of the Pacific Ocean perhaps 3 million years ago. The combined area of the eight main islands is less than that of New Jersey.

All the islands are mountainous. In places the land rises from the sea in sheer high cliffs, called pali, which may tower hundreds of feet in height. Elsewhere rolling plains slope gently to the beaches Frozen flows of dead lava contrast with the lush green of tropical vegetation. Deep ravines and canyons have been carved in the earth by the short, plunging rivers. The beaches, generally narrow, may be white with coral sand or black with ground lava.

Most of this rugged land remains tropical wilderness. Less than 10 per cent can be farmed. Another 10 per cent is pasture for cattle, goats, and sheep

Cooled in summer and warmed in winter by the ocean winds, the islands are seldom too hot for comfort and are never cold. Temperatures are moderated by the cool waters brought from the northeast by the



### FERTILE VOLCANIC SOIL AND A HUGE SUGAR CROP



Here we see the dead crater of Heleskala on Mass one of the volcances that built the islands. He run measures 21 males. The highest of the contex spring from its floor is taller than the Empire State Bu iding.

Cahfornia current Ti e annual temperative at Hono lulu averages 75° F with only about five degrees difference between summer and winter The trade winds blow toward the northeast slopes

of the islands bringing torrents of rain. In a me places the total fall amounts to 300 or 400 mches a year Mount Wa aleale on Kauar is one of the world s wettest spots with rainfall that has amounted to 624 inches in a year Because mounts in b irriers block the winds the southwest slopes may get as little as 10 or 15 inches annually and irr gat on is needed for crops Great water supply systems have been built to carry the excess water from the ra nawept slopes through mountain tunnels to dry but fertile fields beyond

### The Islats to the Northwest

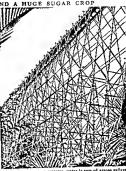
The relets stretching northwest are tiny Ti ey in clude Kaula Nihoa Necker La Perouse Pinnaele or Prench Frigate Shoal Gardner Pinnaeles Laysan Lisianski Pearl and Hermes Reef M dway Islan Is and Lure

The islands from N hoa to Pearl and Hermes Reef were reserved as a refuge for sea birds in 1909 The Territory of Hawaii also administers Palmyra Island 960 m les southwest

### Nature of the Islands-Oahu

Honolulu's good natural harbor helped Oahu become the wealthiest and most populous of the islands One of the world a important ports it is crowded with ocean liners freighters and fishing bosts The business section of Honolulu is much the same as any other American city, with wide paved streets large buildings fine hotels clubs schools and churches The residential districts climb the hills and epread beyond famed Wa kiki Beach Palms shade the streets. The many parks and gardens are bright and fragrant with flowering trees and plants

Near the port and the surport smiling Hawanan women sell less or garlands made from such trop cal and subtropical flowers as hibiscus ginger plumeria



ation systems water to carr ed across s mounted on high trast es. Bund so of cane ma defeon field to mil through these flumes. Cane re 000 pounds of water to produce a pound of sugar

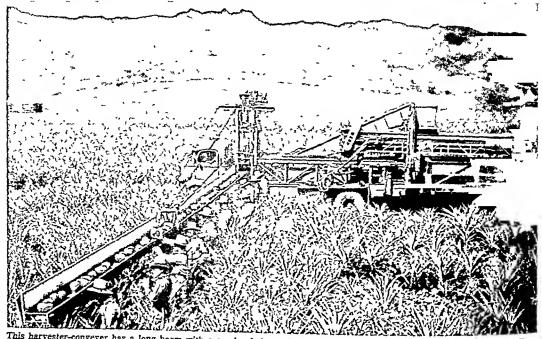


and leaves before cutting the ju cy stalks. They have developed and leaves before cutting the ju cy stalks. They have developed and leavest many scientific laborarating methods for cultivating and harvest many scientific laborarating methods to cuttivating and harvest

ilang ilang ilima gardeniss and crown flower Among the street crowds faces of every shade of white vellow and brown show that this is the home of a complex mixture of peoples

Oahu is the site of most of the military and naval mstallations on the islands Six miles west of Hono lulu 1es Pearl Harbor in a landlocked bas n that could shelter all the ships of the American fleet It is one of the strongest naval bases in the world Here are barracks shops and huge dry docks Scho-

## LABORSAVING MACHINERY IN THE PINEAPPLE HARVEST



This harvester-conveyer has a long boom with a moving belt. It travels ahead of the pickers, who select and pluck the mature "pines" and lay them on the belt. Then the belt drops

them into a trailer to be hauled away to the cannery that the pineapple field occupies the highest land which can be readily cultivated. Beyond rise the rugged volcant his

field Barracks, a few miles inland, is one of the largest United States Army posts. Other Army establishments include Fort Shafter, Fort Armstrong, Fort De Russy, Fort Ruger, and Fort Kamehameha. Hickam and Wheeler fields are the chief Air Force bases. Kaneohe air station on the eastern, or windward, side of Oahu is a base for naval and marine aircraft.

Of Oahu's many scenic areas, perhaps the best known is the Nuuanu Pali, a notch, or pass, in the Koolau Range, where the pali, or cliff, falls sheer for hundreds of feet. It affords a breath-taking view of the windward coast and the Pacific. In a burned-out crater, the Punchhowl, a cemetery was opened in 1949 for servicemen killed in the second World War and in Korea.

On Oahu, as on the other islands, most of the arable lowland up to about 2,000 feet is occupied by big sugar plantations. On higher ground the pineapple thrives. Many of the large sugar-cane processing plants and pineapple canneries are on Oahu.

Hawali, the "Big Island"

Twice as large as all the other islands together, Hawaii was piled up by five volcanoes whose eruptions overlapped one another. Two of these are still active and are continuing the process of island building. Mauna Loa, 13,680 feet, the largest active volcano in the world, has erupted frequently in modern times. Kilauea crater, 4,000 feet up the cone of Mauna Loa, gives visitors an opportunity to look into the heart of an active volcano. A highway from Hilo leads inside the rim of the outer crater. Hardened lava blocks and fissures spouting sulfur fumes line the path to the fiery cauldron of the inner pit. Here a lake of molten lava swells and ebbs. In 1790 a sudden eruption of hot ash destroyed an army marching against King Kamehameha I. Kilauea erupted in 1952 after 18 quiet years. These volcanoes, together with the extinct volcano of Haleakala on Maui, make up the Hawaiian National Park (see National Parks).

Mauna Kea (13,784 feet), the highest peak, is quiet and snow covers its summit in winter. It appears higher than a peak of equal altitude in a mountain range, for it towers sharply upward from the sea.

Hilo, the chief city of the "big island," lies on 2 mountain-girt harhor on the moist, windward northeast coast. Great cattle and sheep ranches in the island's interior raise a good share of the territory's meat. Picturesque cowboys, called paniolas, herd the cattle. Where there are no harbors, they drive the animals into the surf to he loaded on boats for shipment to other islands.

The highlands of the dry west, or Kona, coast provide the soil and altitude for growing coffee. Sugar plantations occupy lowlands. Near Hilo, orchids are grown commercially for export by air freight.

Maui, Kahoolawe, Lanai, and Molokai

Maui, like Oahu, consists of volcanic twins, united at their hase. Mount Haleakala, which fills the eastern half, rears its tremendous crater 10,000 feet into the clouds. A trail leads through the crater where the rare silversword plant grows amid dead cinder cones. Lahaina, on the southwest coast, was the ancient capital of the Hawaiian kings. Here be-





The striking gray silver-sword plant grows in the lava of dormant Haleskala crater on Many Edand.



n 8 few moonlit nights the night blooming cereus opens great waxy blossoms 8 foot long and 81x to sight sathes wide

tween 1820 and 1870 rowdy whaling crews spent the winter while their gressy ships lay anchored in the broad roud-tead. Today Maui has the largest Amer an sugar plantation and many other sugar and pinespole fields and cattle ranches.

Small hahoolase Island was once used extens velv for cattle-raising but its pasture was cropped away by goats and it is now bailly croded. It was used as a bombing range for Navy and A r Force training during the second World War.

James as served by the world a largest praceptly laints as the hart so not now harbor and surport. On Molokas there are ranches and small farms as well as high plantations. Satisuppas as the sale of a famous leper colons where the Belgam purch Eather fossep. Durn en carried on he here or work before leproxy killed him. Wodern treatment has dimm wheel the number of toxinets because

#### number of patients here Kausi and Small Nithau

Lush vegetation on hattus wet undward sloges has given it the title Gratien Island. The tanges flems when flowers and trees of a raw forest grow where mountain peaks puntacles and rawnes are to negged for cultivation. Luwrann fields of praceiphs surar cane and nee spread across it is lower lands. The Grand Canpon of the Na mea has the raushow, colors and majestic forms seen in the Grand Canpon of the Colorado. Remains of missoury walls and state Colorado.

courses oo the island are believed to have been the work of the Menchunes a Polynesian folk who lived bere before the coming of the present Hawanan stock

A single family of Scottish descent hamsed Robin son owns the small island of Nithru. The people here are nearly all of pure Hawanan stock and speak the language of their forefuthers. Cattle and sheep raising are the chief means of livelihood.

People of Many Races
The mhabitants of Hawan are of wanel races and
peoples. Like the United States at was settled by
manugaranty. The Hawanits found free when the is
Land's seen of accovered in 1778 seen a Polymessan.
From Tahlan in outrigger saling cances probably between the 11th and 18th centures. They never—sad
re—a tell strongly built foll with handsome fra
tures broom skin wavy black hair and a gentler
fresdly diposition according to their trad in
they had conquered a smaller Polymenan folk the
Westenbases who had saided from the South Pacific.

Today less than 2 per cent of the people are of pure Bas sams abook and only about 19 per ent are of Hamassa ancestry. The largest of the non-Hamas ang cupses the Japanese compone ga bout 40 per cest of the population. Next are Caucavanacalled Assist achefy American and Portuguess and all the Caucavana and the Cau

Ties myture of peoples developed as great sugar plantations brought in laborers of one nationality and then another to work in the fields. Internaringe between the peoples has increased steadily lowering the proportion of persons of pure racial stock

All Hans can citizens are citizens of the United States. Children born here are citizens even though their parents may be evaluated from citizenship by federal law.

### How the People Live in Modern Hawaii

Most of the people live in the cite of Konolulu and H is in the fee town and in the company vil lages of the big plagations. Their life is very different from the evidence on primitive tropical slands. After it was found that sugar cane and pineapple could be rased profitably in the sool said climate more and more land was used for these purposes. A large share of the people sork for the plantations and for sagar in its said pineapple counteres. Others are enged in triding and finance saling the sugar and pineapple productioning and control saling the sugar and pineapple productions, and other products needed in Heavist. Thousands are employed in service orcupations catering to the needs of the visitory military personnel and perimenter.

The way of ife in Hawaii is essentially American Nearly everyone speaks English follows American content and uses American products Viost of the ways of old Hawaii vanished long ago and the Oriental customs of Japanese and Chinece immigrants are fast disappacting as new general ons attend the

schools. Enough Hawaiian and Oriental features remain, however, to lend spice and variety to island life. Hawaiian words are heard in everyday speech. In giving directions, a place is said to be makai—toward the sea, or mauka—toward the mountains. A person in trouble has pilikia.

The year-round summer encourages residents and visitors to enjoy life in the open air. Houses have outdoor living rooms, called *lanais*. Everyone throngs the beaches where favorite sports are surfboarding and outrigger-canoeing learned from the early Hawaiians. Boys on sandlot football teams give the game a South Seas flavor by playing barefoot. Other sports range from deep-sea fishing to skiing on Mauna Kea's cone.

Traditional Polynesian and Oriental dishes are popular. Hawaiian feasts, called lunus, feature whole roast pig cooked by means of hot rocks in a pit and eaten ontdoors. Entertainment may include native dances, especially the graceful hula, and the singing of plaintive Hawaiian melodies.

Life and Customs in Old Hawaii

The islands and the surrounding sea provided everything the Hawaiians used before the white man came. Their old-time communities usually covered a strip of land running from the beach up toward the mountain-top. From the sea they took fish. On the wet lowlands they grew taro root for their favorite dish, called poi. Here also they built stone fish ponds. They raised unirrigated crops on the higher land. From the forested upper regions they took the timber, leaves, and grasses to construct their houses and canoes and to make spears and clubs for war. From certain kinds of lava rock they fashioned sharp-edged tools. They had no beasts of burden, no wheels, no metals, and no pottery.

They built houses with a sturdy frame of koa wood lashed together with sennit fiber, thatched all over with pili grass. Mats woven from large lauhala leaves from the pandanus tree served as the chief furnishings. Gourds and coconut shells made containers to hold supplies. Skilled woodworkers hollowed out bowls and platters. Small stone lamps burned oil pressed from laukui nuts. Strings of these nuts were skewered

together to make torches.

The inner bark of the paper mulberry tree yielded the material for kapa (or tapa) cloth, from which their scanty clothing was fashioned. Strips of the bark were pounded together to make a man's loincloth (called a malo), or a woman's skirt (called a pau), or for the shawls occasionally worn. The kapa-makers used hardwood beaters carved to print a design in the kapa. Later the design might be stamped or painted with colors made from plant juices or colored earths. Beautiful cloaks for kings and chieftains were made by fastening the colorful feathers of birds in fine-mesh netting.

Foods, Plants, and Animals

The people spent most of their time outdoors. They cooked in a pit dug in the ground. Here they heated rocks red hot. Then they wrapped fish, taro root, sweet potatoes, and other foods in the large, tough

leaves of the ti plant and placed them in the pit between layers of hot rocks. The food steamed and cooked until the rocks cooled.

When the seafaring Polynesians reached Haven they brought with them many useful plants that d'i not grow there before, such as taro, bananas. Figureane, yams, sweet potatoes, ohia ai (mountain apples) and the breadfruit tree. They may have brought the coconut palm, or coconuts may have drifted to the beaches. (For pictures of plants of the area and methods of preparation. For Pacific Ocean.) White settlers later introduced citrus fruits, avocados, pineapples and various other subtropical food plants.

Native animals and land birds were few in the remote islands. The Polynesians imported dogs has and chickens, and the white men brought other dometic animals. Some of the most beautiful native birds disappeared because their feathers were used to make ceremonial capes and helmets for Hawaiian chia's These included the mamo and the oo, each with a fer-

## SPORTS AND CRAFTS OF HAWAII



The exciting sport of surfboard riding was a favorite with the and commoners in o'd Hawaii. Modern Hawaiian athlets this one are equally expert at it. They teach the sport to the in the celebrated rollers of Walkibi Beach.



These girls weaving lauhala leaves are carrying on a craft which was not to their ancestors. The early Hawaiians made floor man baskets, and even cance sails from the tough pandanns leaves.

PIG AND POI







lovely yellow feathers and the red nw. Later settlers homes ck for the s nging of familiar birds have imported many spec es

#### Children Learned without Books

Children learned to a vim almost as early as they learned to walk and soon be ame expert at vater sports They rode surfboards on the easy swells ans de coral reefs They learned to manage the r outrigger canoes in rough water and to fish with nets and spears They went coast ng too but not on snow They sat on a sled of ti leaves and slid down a hill of all ppery grass. They took part in such familiar pastumes as kite flying rope skipping hide and seek and at it walking

Young and old enjoyed boving wrestling fenering and foot racing. They had dart-throwing games and a kind of bowling. The r konane game was something like checkers

There was no school There was not even a written language to read until the missionaries came. Native legends and history were woven into songs and chants which were sung over an I over so all the people could remember them They also dramatized their legends in dances such as the famous bula

The Hang an language is no ten with only 12 letters the five vowels and the consonants h k and i (interchangeable with I and r respect vely) m n p and w (somet mes pronounced like v) Each vowel sound is pronounced senarately

Religion and Government in Old Hawaii Religion based upon nature worship played a large part in the lives of the early Hawamans According to their trad tions the god have created the universe from a gourd or calabash He formed the earth from the pulp of the gourd tossed the shell aloft for the sky and dotted it with seeds to serve as stars sun and moon A second deity Lone added trees

and flowers while a third god his created man Pele the goddess of fire styred the volcanoes to erupt on then she grew huhu (angry)

kings or chefs a ded by priests sorcerers and otl er leaders called & ahungs ruled the communities They enforced control over the people through rel g ous restrictions called kapus or tabus. Death was the penalty for such offenses as letting one a shadow fall unon a chief for eating with a person of the opposite sey or for entering a torb dden dwelling

Commerce and Industry in Modern Hawaii

Sugar products have been the most valuable export of the territory for a century Canned pineapples and pineapple nuce rank second Associations of plan tat on o where carry on scientific experiments on both crops Canes have been developed to yeld a maximum of s teet in ce and a minimum of wasteful leaves Pest-control methods have been worked out Flavorful pineapples have been developed in a shape that vall go into a can with little waste. Planta tion workers were unionised after the second World War and probably get the h ghest agricultural wages in the world

Insulating board made from a sugar-case by prod uct (bagasse) canned fish and coffee are among the secondary exports Orchids and other evot e flowers leaves, and ferns are shipped by air Most of Hawau s exports go to the mainland of the United States In turn nearly all the imports come from the Un ted State: Fresh and canned foods must be brought in because so much of the farmland is planted in the export crops Coal petroleum products and virtually all manufactured articles must be imported

Ocean shipping is important to this trad ng area In recent years air travel has exceeded travel by sh n both across the ocean and between the islands Good highways link the towns with sceme regions and plantations. Railway mileage is small, as trucks have replaced the plantation railways. Telephone messages between the islands are carried by radio.

### Education and Government in the Territory

The territory has a public school system similar to that on the mainland and many private institutions. The schools have surmounted the problem of teaching pupils of many tongues and are largely responsible for Americanizing the population. The first schools were established by missionaries in 1820. Instruction is in English. The University of Hawaii at Honolulu was founded by the legislature in 1907 and is support-

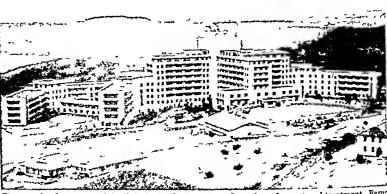
ed by territorial and federal funds. The Library of Hawaii was created by the legislature in 1909. It serves the islands with main and branch libraries and bookmobiles. The Bishop Museum, the Carter Library, and the Honolulu Academy of Arts have fine exhibits and book collections dealing with Hawaii and the Pacific.

The governor, the territorial secretary, and the judges of the supreme and circuit courts are appointed by the president of the United States. The citizens elect the members of the territorial legislature, local officials, and a delegate who represents the territory in the United States Congress. He has no vote in the Congress.

### History of the Islands

Captain James Cook, the famous English explorer, first made the islands known to the world, though

## TRIPLER ARMY HOSPITAL ON OAHU



Thousands of veterans of the fighting in Korea remember this huge military hospital gratefully. En route to mainland hospitals the wounded

were flown here for rest and treatment. Begun during the second World War, its 1,500 beds are available to men of all services.

they were probably seen by a Spaniard, Juan Gaetano, in 1555. When Cook landed on Kauai, Jan. 20, 1778 the people believed him to be a reincarnation of their god Lono. They sent messengers in swift cances to announce his arrival, and he was greeted everywhere by worshipful throngs. Cook was killed on the coast of Hawaii a year later when a fight broke out between his crew and a group of Hawaiians who had stolen a boat. He named the islands the Sandwich Islands (see Cook).

Trade between the Occident and the Orient increased tremendously in the following century, and Hawaii became a supply point for whalers and trading vessels. Masters of the sailing ships discovered sandalwood here and opened up a trade with China that stripped the islands of these trees.

HONOLULU HARBOR, KINGDOM OF HAWAII, IN 1882

When this scene was photographed in 1882, ships in the harbor were chiefly sailing vessels. They carried most of the huge

cargo of raw sugar to the United States. Regular steamer service to and from San Francisco had started only recently.

Between 1792 and 1810 King Kamehameha I con quered the various local kings and chiefs and united the islands under a single ruler. His descendants reigned over the islands for almost a hundred years

The first missionaries were Congregationalists who came from Boston in 1820 on the ship Thaddeus They were followed by others from America and Europe They became advisers to the rulers and were influential in liberalizing the government and in advancing education. The descendants of the early missionary families have played an important part in the industrial and commercial development of the islands

The leading commercial nations of the 19th century were rivals for trade and influence in the islands. They vied with one another in making tavorable treaties with the government and in heaping layors and hon ors upon the rulers. The Americans had been most active in developing the rich sugar industry and gradually they attained the greatest influence in the islands

#### Annexation to the United States

In 1893, when Queen Lahunkalanı attempted to aboush the constitution granted by King Lamehameha III, a revolution took place The queen was deposed, and the new government applied for an nevation to the United States. When he took office President Grover Cleveland withdrew the annexation treaty from the United States Senste on the ground that the United States minister backed by marines from a naval vessel had improperly axisd the revolution. Hawaii was then organized as a republic in 1894 with Sanford Ballard Dole as president. In 1898 during the administration of President William McKinley a treaty of annexation was concluded

The decades following saw great economic progress and the spread of American institutions and curtoms throughout the islands Meanwhile the United States built defenses for its distant territory. It had obtained the evelusive right to use Pearl Harbor as a naval cooling and repair station in 1887 but build ing did not begin until 1908. The same year the War Department ordered the construction of Schofield Barracks Expansion of army navy, and air installations was under way on Dec 7 1941, when Japan launched its attack on Pearl Harbor (see World War Second)

Fearing an invasion attempt, the Army proclaimed martial law Civil government was not restored until Oct 18 1944 Anviets arose at the presence of more than 150 000 people of Japanese birth or extraction Suspected leaders were interned but the vast majority worked peaceably on the plantations and construction projects and there was no sabotage Hawanan-Japanese troops made a notable combat record in Italy during the war

After the war the people renewed their plea for statehood but the United States Senate postponed action During the fighting in Korea, the islands again played an important role as a military crossroads and supply base

HAWK Until recently all hawks had the ill will of every farmer and aportsman because of the havor which some members of this large group work among poultry and other birds Careful study has shown that all but three species do more good than harm by destroying enormous numbers of small rodents and meets harmful to grain fruit trees and birds The true bird killers and the only ones that deserve the name hen hawks ' are the sharp-shinned hawk. Coopers hawk or the blue darter, and the goshawk These are bold marauders and do most of the mischief that is attributed to the hawk group

About 450 distinct species of hawk are recognized but only 34 are found in the United States and Canada. All of them hunt by day and possess remarkable keeness of vision great swiftness of flight and im mense clutching power They are distinguished from the vultures by the fact that they rarely taste anything they have not themselves killed Most of them are plain colored in browns and gravish whites with darker markings and are unadorned with plumes They do not sing but have a call resembling a haish



hitle to hide it. The male hawk helps in building like nest and an fredung the young birds. Here we see him guarding the nest and its neven eggs. The bawks are aggressive and even young and its neven eggs. The hawks are aggressive and even young ones still in the nest will fight if a man attempts to touch them

seream According to species they nest on the ground or in trees

The sharp-shumed is the smallest of the three per mesous hawks It is a bird about 11 or 12 inches long, bhush gray above, and white, heavily barred with brown beneath Although little larger than a robin this murderous little villain will destroy all the small bards in its neighborhood, from the flickers and doves to the tmy warblers It is partial to chickens and often exterminates whole broods

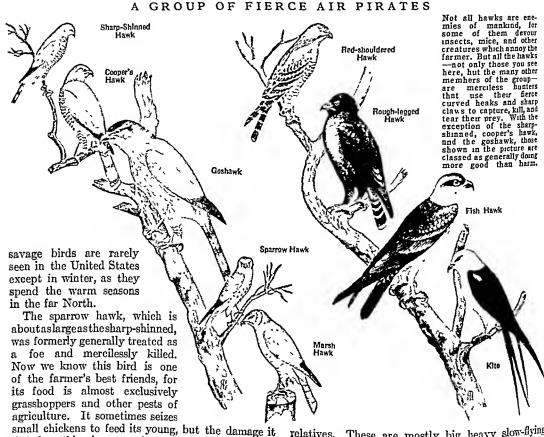
Cooper's hawk, which is about one third larger than the sharp-shanned is even more fierce and destructive It will snatch a young chicken before the eyes of the farmer It not only carries off good sized fowls but

even grouse and rabbits

The goshawk is twice as large as the sharp-shinned, and is the boldest and most destructive hawk. This bird has been known to snatch a wounded game-bird from beneath the feet of the hunter. The young goshawk, which is even bolder than its elders, is sometimes confused with the harmless red-tailed hawk, because of its brownish plumage. Fortunately these

tions are inconsiderable. This falcon was reserved exclusively for the use of earls, while only royalty could hunt with the great gyrfalcon. (For illustration in colors of sparrow hawk, see Birds.)

Nearly all of the buzzard hawks are valuable alles to the farmer and sportsman, although they have been made to suffer for the sins of their buccaneering



does is nothing in comparison with its services. The sparrow hawk is one of the varieties properly classed as falcons. These are distinguished from other hawks by having the beak hooked at the point, with a notch or tooth on the cutting edge of the upper mandible. They are the most perfectly developed of all birds, remarkable for their strength, symmetry, and powers of flight, and were the birds chiefly employed in the sport of falconry, which was one of the most popular amusements of the Middle Ages. With "hooded" falcons on their gloved fists, the hunters would sally forth in search of game birds. When the "quarry" was sighted, the falcon's hood was slipped and it was thrown into the air, to dart like an arrow at the prey, plunging its talons into it and crouching over it until the hunter galloped up. The most prized falcon was the peregrine or duckhawk, which is today so rare and shy that its depredarelatives. These are mostly big heavy slow-flying birds, with long broad wings and a broad tail, while the falcons have shorter tails and long, pointed wings Among the most serviceable varieties that should be carefully protected are the marsh hawks, which are said to destroy an average of 500 field mice apiece during the nesting season; the red-shouldered and the red-tailed hawks, often unjustly called chicken hawks, and the rough-legged hawks, which are feathered down to the toes and come to the United States in winter to range the fields in search of mice. Some of these friends of the farmer may occasionally seize a chicken to feed their young, but the damage is made up many times over by their services.

The fish hawks, or ospreys, are close relatives of the hawks and falcons, but they live exclusively on fish. They are found on all the continents near the ocean or other large bodies of water. They cannot dive, as the ducks do, but catch fish by pouncing on them



The ospreys strong legs and claws can bordered with black strapes white break series and carry large fish. You may racog must be bird at a distance by hit which sheet do wangs which are shall crocked even in n is strong to the contract of the first strategy and the break strangers and the break strangers which are shall crocked even in n is strong to the contract of the contract

as they swim near the surface and sering them in their talons. As they fly away they hold the fish head forward A see eagle especially a hold eagle will often rob a fish hawk of its prey by driving it higher and higher until at last the hawk tires and drops the fish (see Eagle).

Autes are medium sized birds closely related to the hawka. The swallow tailed lites of the southern United States are among the most graceful of all birds. They seem to live almost entirely in the air soaning for hours on their long powerful wings. They even p ck up food and water while in flight The head and underparts of th s bird are white the back wings and tal black Mississippi Everglade and white-tailed kites are also southern birds

Summers birds

Lites hawks eagles and
falents belong to the suborder Falconiformes of the order
Falconiformes Scientific
aume of sharp shinned
hash Accipiter telox telox
marsh bank. Cirrus hudonis gushawk Astur airea
pillus stallow tailed kite
Elamoides for featus forficatius copies Pandion hainetius cordinents sparrow
hawk Falco sparrerius
peregning falcon or duch
hawk Falco peregninus

HAWKINS SIR JOHN (1522 1935) Among the bold seamen of Elizabethan England none ganed a greater reputation for reak-levs daring than John Hawkins He was the first to defy Spans power in the Vest Indies and the first to open to he southry the commerce of the New Yorld

John Hawkins was born in Plymouth in 1522 the son of a sea captain at 1 wealthy she powner On several trading tip at 65 pa in Portugal and the Canary Islands young Hawkins head fascinating tales of a their their their their their without can migmed to whe went about 10 whe went about

it In 1562 he sailed to Af rica where he acquired 300 Aegroes by the sword and

other means. Then he set forth for Santo Dom ogo m the West Indies to trade his cargo for pearls hides inger and sugar. The Span sh colonists were forbul den by Spa o to Irade with any foreign nat on bithey were as tager to buy the slaves as Hawkins was to sell them. When necessary. Hawkins persuaded them to meet this terms by force of arms.

On Hawkins third voyage (1567-68) his cousin Francis Drake commanded the third and smallest vessel of the fiset (see Drake). Hawkins committed various acts that would be called pracy today before he boldly sailed his fleet into the harbor of Vera Cruz. in Mexico. The next day an armed Spanish fleet arrived in the port. In the fight that followed, Hawkins lost many sailors and one ship.

For the next 20 years he remained at home in the service of Queen Elizabeth I, building up her navy in anticipation of the coming conflict with Spain for supremacy of the seas. As treasurer and comptroller of the navy he managed the whole naval force of the nation. He redesigned vessels and introduced many of his own inventions, worked out in practical experience at sea. In the great battle in which the Spanish Armada was defeated (1588) Hawkins served as a vice admiral and was knighted for gallantry.

In 1595 he sailed with Drake on what was to be the last voyage for both men. Old and sick, he joined the expedition to attempt the rescue of his only son, Richard, who was a captive of the Spanish at Lima, Peru. He died off the coast of Puerto Rico.

HAWTHORN. The white glory of the English countryside when the hawthorn bursts into bloom has inspired the song of many a poet. The English tree has been introduced into the United States, but the many native American species are no less beautiful.

Hawthorns are low, shrubby, thorny trees, seldom more than 25 feet tall. They are favorites for hedgerows and ornamental plant-

ings in gardens, where they do best in sunny locations and in limestone soil enriched with loam. In the spring they are masses of white, pink, or crimson blossoms, which show the close relationship of the hawthorns to the rose family. The flowers are followed by red fruit, like miniature apples, known as "haws" or "thorn apples." The fruit of some of the more southerly species may be made into jellies and preserves. The wood is very hard and is valuable for making mallet and hammer handles and other implements. The English often call the hawthorn the "may tree," and use the flowering branches for May Day decorations.

The hawthorns are widely distributed through the temperate regions of the Northern Hemisphere. In North America alone there are more than 900 species; Europe has about 60 species. The name of the genus Crataerus comes from the Greek word Iratos, meaning "strength," referring to the hard wood. Scientific name of the English hawthorn, Crataerus oryacantha; the red haw, or scarlet haw of southern Canada and northern United States, is Crataerus intricata. The state flower of Missouri is Crataerus mollis. The so-called "black haw" is the sweet viburnum of the honeysuckle family.

HAWTHORNE, NATHANIEL (1804–1864). "Harthorne," says an American critic, "is without doubt the most perfect workman of all American men ciletters." No one questions his right to the title ci a genius. He was a true artist who took time and pains to make his language the fitting expression ci his thought. Finely sensitive to beauty, his style is delicate, simple, and pure. He had also a gift of peretrating insight into human hearts.

A native of Salem, Mass., he was a true New Enclander, his ancestors having come to the New Worldin 1630. Born and bred in Puritanism, steeped in its legends and tradition, Hawthorne interpreted the Puritan spirit as no one else did. His greatest book.

'The Scarlet Letter', is the story of sin and punishment and repentance in old Salem. 'The House of the Seven Gables' was somewhat like the home of his own childhood—solitary, gloomy, haunted by an ancestral curse.

His father, a sea captain, died when the boy was forr years old. His grief-stricker mother retired into a lonely world of her own. She dri not even take her meals with her son and two little daughters. When Nathariel was nine years old he broke his foot, and for nearly two years was confined to the house with only his books and his sisters for comparionship. The brooding mirthless home turned his thoughts inword Hederel-

This photograph of Hawthorne was made in 1850, the year the Scarlet Letter was published. He was a man of medium black, his eyes dark blue and astonishingly brilliant. The brooding mirthless home turned height and slight but athletic build. His hair was almost black, his eyes dark blue and astonishingly brilliant. The brooding mirthless home turned his thoughts inward. He dereloo best in sunny locations oped a shyness and reserve that he never overcame. A year in the forested wilderness of Sebago Lake, Mewhite, pink, or crimson lose relationship of the nature and increased his love of solitude. He attended

Bowdoin College from 1821 to 1825.

After Hawthorne left college he returned to Salem, where he lived almost like a hermit until he was 33. Though he published little, this long quiet time c. preparation doubtless accounts for his depth of thought and perfection of style, for there is never anything crude or immature about his writing.

For a time Hawthorne lived at Brook Farm, where a group of literary men and women were trying an experiment in communal life, and from this he got the idea for his 'Blithedale Romance'. He married Miss Sophia Peabody in 1842 and for a time they lived in Concord, Mass., in the "Old Manse," in intimate friendship with Thoreau, Emerson, and Margaret Fuller. Then, because he could not earn enough by writing to support his family, he took a position in the Salem custom house. Under the



influence of the old atmosphere that had so strongly touched his imagination his thoughts began to take definite shape in the story that made him famous The Scarlet Letter (1850) After it was published

as he said 'fame was won and his future was secure When Frankin Pieco became president he sout his old classmate as consul to England to Hawthorne had a chance for European travel visiting also France and futur Broken by ill health and saddened by the Civil War he did not hive many years after his return in 1860 The Dolliver Romance he had hever fin

ished, and the manuscript was buried with him
None of Hawthorne's novels could be called bright

and cheerful though they have touches of camele tours, and thereful though they have touches of engine part tourses. They are overhouse that they are continued to the continued

Hawthorne a practical works were Nords—The S arket Letter (18:00) The House of the Swern Galdre (19:31) The House of the Swern Galdre (19:31) The House of Swern Galdre (19:31) The House of Swern Galdre (19:32) Wouse from an Old Mune; (18:40) Our Old House (18:32) Mouse from an Old Mune; (18:40) Our Old House (18:32) Evolution of Swern from the Conference of the Lorendather to Alex (18:41) A Wonder Hook for Boys and Gra (18:41) The Store Image and Other Tales (18:51) Tampleword These (18:52)

HAY One of the most important farm crops is key In the United States alone about 190 m is on to is are produced each year. The crop is usually exceeded in value only by wheat corn and cotton

Hay is the principal winter food of cattle and horses it is cut as fooder from legumes such as clover alfalfa and sopheam and from grasses such as time othy upland grasses and midland grasses. Even coreals such as type oats and barley may be cut and cured as hay Some hayfields like alfalfa and red

clover produce two or more crops in a year To retain the eugar and other soluble matter stored in the stalk and leaves, hay must be cut while it is still in flower and before the seed matures If left standing too long the stems and leaves become dry and useless for feed After farmers cut hay, they leave it on the field several days to dry or cure in the sun. Curing develops a desirable flavor and keeps the hay from sposling when stored To keep fresh-cut hay from drying too rapidly formers rake it into windrows or put it up in cocks. Cured hay is stored either in bulk or in bales Bulk hay is loaded in racks for hauling to the barn or stack. Sdedelivery rakes hay tedders and automatic loaders do most of this work. To make storage and fransportation easier farmers may press hay into bales in

When hay hes drying in the field heavy raims can ruin the entire crop. Many farmers now aroust this loss by art ficially curing the hay in scientifically estillated hay mows. Good ventilation is needed to keep the hay from heating and perhaps catching fire.

Another method consists of cutting and chopping the hay while it is still very green. After one day of drying this hay is put up in sides. There fermentation changes it into salage (see Silo)

The chief hay producing states are Wiscons n Min nevota New York California Iowa and Nebraska HAYPON FRANZ JOSEN (1723 1809) The nek name Papa Haydn by which this great musician was fam harly known expresses the deep affection in which he was held by all who knew him. He was a

real father to his associates as he was to all young and struggling men of talent

struggling men of talent Haydn's father a mechanic of the town of Rohrau m lower Austria was a man of refined tastes He was fond of music and the evenings of Hayda's early childhood were spent listening to his father play the harp while his mother sang the folksongs of Hungary the themes of which later found their way into some of the finest compositions of the master The child showed marked ability along musical lines and at the age of eight was made a chorister in the chapel of St Stephen in Vienns Here for nine years he sang and atuded but at the ege of 17 his voice broke Because of some boysh prank, he was expelled from the school and found himself penniless in the streets Ten long hard years followed Hungry, cold ragged but always devoted to the art of music Haydn struggled against poverty and at last fortune amiled Ha was made director of the orchestra of Prince Esterbary at that time the finest in Austria and for 20 years he held this position. During this time his compos tions were most numerous and his fame as a composer spread to Leipzig Paris and even London

The fereddisp which spraig up at this period between Highly and the great Monard was one of great moments for both the componers. Monard was of make in his recognition of the elder man e work that he said he never heard one of Haydra a compout those without fearing something from it and called him the greatest componer in the world. Haydra profiled not less from the association for it was from Morard that the derived much of the mastery of correlated effects that marks has their symphonics.

When 58 years of age Hayda vasted Lingland He was recoved with the greatest enthusans and Ox ford University conferred on him the degree of Doctor of Musse. During his stay of 18 months he wrote the opera. Ories and a v of his 12 London Symphonies. He spent another year in London in 194 5b. The visit was as successful as the first.

In his 66th year Haydn's great oratorio The Creation was produced Among the compost one of his declining years was the Austrian national anthem. He died in Vienna during the French occupation of that city and many French officers were among the mourners at his funeral.

Hayda composed a tremendous amount of music His works include 104 symphonics 31 concertos 77 string quartets 4 oratorios 53 sonatas for the nano 14 masses and stores of smaller pieces

# PRESIDENT HAYES, Valiant Fighter in War and Peace

HAYES, RUTHERFORD BIRCHARD (1822-1893). "The name of Hayes began by valor," wrote a member of the Hayes family in the 17th century, and the family tradition was worthily carried on by Rutherford B. Hayes, the 19th president of the United States. On the battlefields of the Civil War, and equally in the White House at Washington, he displayed conspicuous bravery in overcoming difficulties and in fighting against great odds.

Hayes's administration is especially noteworthy for being ushered in by a dispute concerning the presidential election, which was so bitterly contested that civil war loomed as a possibility. This was the only time in the history of the country that such a danger threatened, except when war actually came with Lincoln's administration. Hayes's term of office was also

marked by the ending of the Reconstruction Period in the South through the withdrawal of federal troops, by the resumption of specie payments, and by the passage of the Bland-Allison silver act.

Contributions to Education

Rutherford B. Hayes was born in Delaware, Ohio, Oct. 4, 1822, and received a good education, which enabled him to fill well all the positions in which he was placed. In 1842 he was graduated from Kenyon College (Gambier, Ohio) as valedictorian of his class; and after three years more of study, in a Columbus law office and in the law school of Harvard University, he was admitted to the bar of the State of Ohio. To the end of his life Hayes maintained his interest in education. When he was in Congress he worked to improve the Library of Congress; and after he retired from the presidency he served on the board of trustees of Ohio Wesleyan University, and of the Ohio State University. He was also a member of the board of trustees of the John F. Slater Fund for the promotion of industrial education among the Negroes, and of the Peabody Education Fund for the promotion of education in the South.

# His Service in the Civil War

Hayes's early interest in the Negro was displayed when he cast his first vote for Henry Clay, in 1844, as an anti-slavery Whig. To this party he adhered until the formation of the Republican party, in 1856. He was active in politics and public affairs in Cincinnati, where he had opened a law office in 1850, and was elected city solicitor in 1858. When the Civil War broke out, following the Republican triumph in the election of Lincoln in 1860, Hayes immediately



RUTHERFORD B. HAYES

volunteered for military service, and was elected captain of a regiment which was raised by the literary club to which he belonged. He declined at this time a commission as colorel which President Lincoln sent him, but later accepted a major's commission. His courage on the battlefield was conspicuous, as was proved by several wounds received in notable engagements and his conduct in the battle ci Winchester (Sept. 19, 1864), where he led his brigade through a deep slough in the face of the enemy. This gallant action won for him the admiration of his men, and the rank of brigadier general. He was promoted later to the rank of major general of volunteers.

While he was still in the field (August 1864) he was nominated for Congress from his home ditrict in Cincinnati, Ohio. A

friend urged him to apply for leave of absence that is might campaign for the position, but Hayes refused saying: "An officer fit for duty who, at this crisic would abandon his post to electioneer for a seat in Congress ought to be scalped." Without any effort can his part he was elected and served with ability. In 1866 he was re-elected, and before his second term had expired, he resigned to become governor of Ohio Three times he was called upon to act as governor of that state. The last time he was elected (in 1876) he stood on a platform calling for "sound money," in opposition to the Democratic policy of indefinitely postponing the resumption of specie payments and the policy of paper money.

The Famous Hayes-Tilden Election Dispute

It was Governor Hayes's position on this question that won for him the Republican nomination for the presidency in 1876 over James G. Blaine, vith William A. Wheeler of New York as vice-presidential candidate. The Democratic candidate for president was Samuel J. Tilden of New York, who was also supported by many reform Republicans. Three states-Louisiana, Florida, and South Carolina each sent in two sets of returns, one for Haves by the "carpetbag" government, the other for Tilden, by governments set up by ex-Confederates. Both parties charged frauds on the part of their opponents. The Senate was Republican and the House Democratic, so the decision as to the disputed votes was left to an Electoral Commission, conposed of five senators, five representatives, and five justices of the Supreme Court. The decision by a party vote of eight to seven on every question

favored the Republicars, and Hayes was declared by 185 election I vote to 184 for Thien Party feeling ran high, and some hothcarls urged the Party feeling ran high, and some hothcarls urged the Democrats to take the government by force but Fres dent Grant placed troops where they might be used if needed and the muguration took; place peacefully The United States passed out of the penned of the Crul War and into an err of procepticly, business levelopment, national aspiration and elass contromany Democrates asserting that duck has entiticated many Democrates asserting that

the Republicans had stolen the office An investigating committee of the House of Representation of the House of Representation of the House of Representation of the House of Republican Senate committee found evidence of a Democratic plan to bribe election officials in two of the Southern states Evidently both parties Evidently both parties also soled hands and the stincks on Hayes an integrity fell flat.

A Strong Cabinet Most of the men Hayes chose for his cabinet were of exceptional quality William M Evarte the secretary of state was one of the greatest lawyers in the country He had been President Johnson's chief counsel in the impeachment proceedings, served (1868-69) as attorney general of the United States, represented the United States before the Geneva Court of Arbitration, and was chief counsel for the Republicans before the Hayes-Tilden electors! commission John Sherman, secretary of the treasury, had

entered public life as an opponent of the Kaness-Nebraska Act, served as a member of the House of Representatives (1885-61), then served as senator from Ohio (1831-77). He was for ten years channan of the Senate commuttee on finance, and the set of 1868 providing for resumption of specie payments was largely has wock

As Briggely his work.

A flurd imported the matter Schurzwas a notable schurzwas program and schurzwas produced by the United Schurzwas flurght great prome Europe Born in Germany highly elucated, and a skilled museum he was forced out of Germany as a result of his activate in the German revolutionary movement of 1885. He was cold the schurzwas flurght was allowed to the flurgh the schurzwas and the schurzwas and the schurzwas flurght was allowed to the flurght f

Republican party In 1861 Lucoln made him municate to Spain, but he resigned after a year to become a brigadier general (later promoted to major general) in the Union army After the war he did a daily paper, first in Detroit and later in 81 Louis in 1860 be was elected to the Senate Jrom Miysoun and he roon became one of the most active of the reformers opposing President Grant As secretary of the interior he made special efforts to give the Indiana just and human tertainent and to place

the ervil service on a ment basis. He attacked the plunder of public thanks and urged Americans to preserve their forests. For the rest of his life (he died in New York City in 1908) he was probably the most prominent

German American citizen End of 'Carpetbag" Rule Whether Hayes or Tuden was elected the Civil War was over. for both candidatee had made up their minds to remove the United States troops from the South. and to leave to the Southern people the working out of their own future The 'carpethag' politicians among Republicans objected to this sad sttacked Hayes bitterly for deserting them Mischine politicians who had grown rich and powerful through the 'spoils system' of political appointments fought him for his continued efforts toward civil service reform His

administration was full of con-

troversy, with radical Republi

cans attacking his party lovalty.

and with Democrats always in

ADMINISTRATION OF RUTHERFORD B HAYES 1877-1881

Civil Service Reform begun Federal troops removed from the South and Reconstruction ended (1877)

ended (1877)

Hahfaz Award in lisheries dispute
with Great Britain (1877)

First electric lighting of streets (1877)
Use of telephones begun (1877)
Miners'strikes ("Molly McGuire" outrages) and railroad strikes

Right of States to regulate ratiroad rates upheld (1877) Greenback Party at height of its power (1878)

Bland-Allison Silver Act passed over the President's veto (1878) Resimption of specie payments (1879)

Exodus of southern freedmen to northern states (1879-80) Not renominated because he had opposed Congressional leaders

> entrol of one or the other house of Congress, and obstructing measures of government sponsored by the administration. Once Congress even adjourned without voting money to pay the army, and private bankers had to lend the money with which to pay the troops

Advancement in the South

But the South started on a new en, with ruleroad rebuilding, and with new factories manufacturing much of its cotton into cloth. The white people of the backward areas of the South found employmen, me there factories. Some of the freed Negroes moved, North hunting better pols, and for a while the South feared that its labor employ sould disappear. Many Negroes were belegod to independence by new ventures in education, of which the school at Tuskerge, Aladicated by Booker T. Washington, was most nother disappear of the school of the school of the polidar disappear of the school of the school of the booker T. Washington taught his race to be frugula and industrous, and not to worry too much about their publical rights and privileges. (See Washington, Booker Thislatero).

Prosperity came back to the United States in the administration of Hayes, but before it was well established the government had to decide whether financial

STORED TO REDEEM



This 1878 cartoon pictures John Sherman, secretary of the treasury and author of the Resumption Act, guarding the gold accumulated to redeem the paper currency (greenbacks) in circulation.

policy was to be directed to secure the eredit and welfare of the whole country, or to give advantage to a single class. Ever since the Civil War prices had been declining. From 1862, when legal-

tender greenbacks first appeared, until 1879, when the Treasury was able to redeem them in gold, all prices were "paper" prices.

Paying Debts with High-Priced Money In 1864, when it looked as though the South might win, "paper" prices were very high, nearly three times their pre-war average. But as confidence in the ability of the government to resume the payment of gold increased, the value of greenbacks increased. This means that prices fell, because the better the money, the more it will buy, and the lower the price. The fall in prices after 1864 bore heavily upon all who owed money, for with every decline it took more bushels of wheat, or bales of eotton, to pay a debt. This made it hard for the farmers of the West, where heavy debts were incurred in setting up new farms, and for those of the South, where the landowners, depressed by warfare and defeat, had been obliged to borrow money to rehabilitate their plantations. Some leaders urged postponing the

resumption of specie payments; some wanted it abandoned and yet more paper money issued by the government, so as to lessen its value and make prices high. Some even wanted to pay the whole national debt in "fiat" money. The panic of 1873 increased the number of those whose burden of

debts made it hard for them to face a fall in prices In the Middle West a Greenback party soon appeared, and there was a Greenback candidate (Peter Cooper) for the presidency in 1876. Hayes was devoted to sound money, and to resumption at as early a date as possible, and prevented Congress from repealing the law fixing January 1879 as the date for this. His secretary of the treasury, John Sherman, began to gather gold in the Treasury to redeem the greenbacks. The movement to prevent resumption had some support from labor while the depression lasted and there was much unemployment. In 1878 the Greenback-Labor party elected 14 congressmen.

The Bland-Allison Act

In the same year the opponents of resumption added to the amount of cheap money in circulation by passing, over the veto of Hayes, the Bland-Allison Act. It directed the United States to buy each month at least \$2,000,000 worth of silver, and to coin it into standard silver dollars 16 times as heavy as the gold dollar. Owners of silver mines in the West supported this, as did the Greenbackers, because the silver dollars (whose bullion value was about 90 cents) would provide more and cheaper money. But in spite of all ob-

struction Hayes carried out resumption, and the United States redeemed in good faith its promise to pay the greenbacks in coin. Never since 1879 has its credit weakened. Its refusal to make shifty evasions

THE TELEPHONE IN USE-A TRIUMPH OF THE HAYES PERIOD



This cartoon of 1877 pictures Alexander Graham Bell and points out the benefits industry derived from the introduction of his telephone. mitter and receiver of the first instruments were alike, you may nonce.

of its obligations has made it easier for the government to borrow whatever it has needed Those who had property were indeed helped by this action that kept the value of the dollar high, those who owed money found their burdens increased But the United States refused to violate its obligations in order to help even a class of STRIKERS BURNING RAILROAD STATION AT PITTSBURGH

deserving debtors With national credit assured, prospenty became general after 1879 The railroads resumed building, which they had stopped in 1873. and in the cities there was construction of houses and factories to accommodate the growing About industries

this time the telephone and electric hght came into use Many new inven-

tions found a large market, lightened labor for the worker, and increased the profits of the manufacturer. Kerosene was used generally as an illuminant The camera was popularized The great fortunes of the railroad magnates, the manufacturers, and the bankers increased in size, and before long a problem of monopoly was raised and became of public interest.

Capital and Labor While the foundations of this prosperity were being laid, the relations of capital and labor came to the front American labor, certain to become classconstious as the factories increased, awakened earlier through the influence of immigration Many of the unmigrant workers had belonged to unions at home, and some were Somalists Some of them had been forced out of Europe for their radical ideas, and within the American body of workers they were an aggressive group In 1877 there were violent strikes on the "trunk-line" railroads, as those lines connecting tidewater with the Mississippi Valley were called The men struck for better wages and against the increase in the size of trains, which more powerful locomotives were now able to haul When they struck, many were discharged Crowds of men out of work, and of disorganized hangers-on sometimes fought with the new employees, or destroyed stations, sheds, and ears Militis, called out to magntain order, was not able to do it Finally, Hayes sent United States troops to the railroad centers, where by their authority, rather than by force, they produced order at once The strikes faded out, bot an organized labor movement lasted, and the old and secret Knights of Labor were soon joined by the American Federation of Labor, while local and craft unions multiplied in the period that was beginning

In the 15 years after Hayes became president, the United States increased in prosperity, but lost much of the sumplicity of life that prevailed before the Civil War It was shifting from agriculture to industry. More people were moving to the cities, and on the farms fewer hands were producing an increasing

output, by using machinery. The farmer began to send his children to the state agricultural colleges that had been founded under the Mornil Act, and to demand more instruction and aid from the United States 201ernment-aid that

came when a Department of Agriculture was created m 1889 President Haves.

hunself, when he re-

tured from office, gave freely of his time to educational work, and to philanthropic ventures like the National Prison Reform Association He was fortunate in having enough money to let him live as he pleased, and his borne, Spiegel Grove, near Fremont, Ohio, became a center of hospitality and useful influence His old army friends and the soldiers of his command were always welcome there He was proud of having signed, for their benefit, an Arrears of Pensions Bill that increased the allowance given to disabled veterans No Union soldier, he said, "ought ever to be forced to choose between starvation and the poorhouse" He died at Spiegel Grove, Jan 17, 1893,

after a short finess HAZEL Although the hazel furnishes effective little rods for hoops and baskets and crates, it is known chiefly for its nuts Some cultivated varieties grown in Europe, such as the filbert, are collected for the market, but the two woodland species that grow in North America are mere shrubs or bushes and the nuts have little market value. These nuts he in leafy cups in clusters of two, three, or four, and from their hight brown shade we get the color term "hazel" The oil pressed from hazelauts is used by perfumers and painters and in medicine

In certain European lands the forked hazel twig was once believed to be a magic divining rod that could point to the place where precious minerals or other objects lay hidden, or where water might be found by well diggers In North America this power was ascribed to an entirely different shrub-the witch-hazel

The hazels belong to the birch family (Betulaceae) Scientific name of common hazel, Corylus avellana of American hazel, Corylus americana.

# YOUR HEALTH and HOW TO KEEP IT



HEALTH. Our most valuable possession is good health. But what is health? The word means "whole and sound," hence free from injury and disease But good health means more than mere freedom from injury and disease For good health, every part of the body and the mind as well must be in fine working order.

The science of preserving health is called hygiene. The word comes from the name of the ancient Greek goddess of health, Hygeia. We can appreciate our own ways for keeping healthy if we know some of the Greek ideas about health.

### The Greek Gods of Health

The ancient Greeks believed that disease was a punishment sent by the god Apollo when he was angry. At first, the only way to get well was to pray to the god. But then other gods came to help.

Apollo had a son named Aesculapius, who learned how to heal sickness from the centaur

Chiron. For a time Aesculapius lived on earth and kept people so healthy that nobody died. But Hades, the god of the underworld, complained to Zeus that no one was coming to his region. Zeus satisfied Hades by killing Aesculapius with a thunderbolt. Then he satisfied Apollo by making Aesculapius the god of medicine. After that, Aesculapius watched over men from the heavens and answered their prayers for health.

He had two daughters who helped him. One daughter va named Panacea She became the goddess of healing. (We still uher name to mean a remedy for all diseases. Of course, such a remedy is as mythical as Panacea herself.) Another daughter, nam-d Hygera, helped to keep people well. The Greeks built temples to honor Aesculapius, Panacea, and Hygeia They brought their sick to these temples and to the temples of Apollo These served as how pitals and the priests served & doctors.

#### Our Modern View

Today we do not believe that disease comes from angry god. We believe that it comes when something goes wrong in the body, or disease germs attack us, or ve live in unhealthy ways. And ve do not pray to a goddess for health. We try to avoid the causes of decase. So for us, hygene means

two things We mut prevent disease and injury and we must promote good health by living wisely.

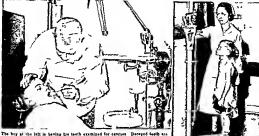
Our practise of hy giene has two broad divisions. We call our measures to help the community "public health" (see Health Department). Our measures to help individuals are "personal hygiene"

Community Hygiene
Community hygiene consistsofmers
ures which promote
health among all citzens. The Federal
government's Pure
Food Laws are one
evample (see Pure
Food Laws). Each

Fresh air, exercise, and cleaniness are three "musts" for good health. The recess period at school should he spent out of doors in active play whenever the weather permits. Between school and dimer time some outdoor play is wise. At camp as well as at home face and hands should always he washed hefore meals.

state has laws to safeguard food. Most cities have health laws and a health department to enforce them Cities purify water and dispose of sewage and garbage to help prevent epidemic diseases such as typhoid (exception of the sexual conditions). Some cities examine school children for tuberculosis. Most of them require vaccination. Health officers inspect public eating places and try to check infestation by rats and other verming

### REGULAR VISITS TO DOCTOR AND DENTIST INSURE GOOD HEALTH



The boy at the left is bring his tests aronized for carties. Decayed death sources of intest on and server it person therete and great on 6 food. At the part & buy is being we shed. If So a underwe git his dest may need to be contacted. The forth sacre is the agree is been used to sheek his spraight.

Such measures can make modern cities reasonably free from general dangers to health. But they cannot keep individuals from injuring their own health A city can furn th pure water but it cannot keep its people from drinking at country streams which may routen typhoid germs. No laws can keep anyone from

straining his eyes under improper light. Laws cannot keep people from overesting or underesting standing incorrectly evertising too little or too much or letting teeth become decayed and infected. Laws cannot force people to get sufficient sleep and to cover their mouths when they sneare or cough in public.



deery time you ancree without corridary your merit, with a bentherabled, you black the air about you wit in hillions of germa. This could be also also the property of the pro

In all these ways, we can injure or ruin our own health, and imperil the health of others. Millions of people do just this every year. So while the community looks out for public health, it is important that we all know the laws of personal hygiene and observe them carefully ourselves.

### What Personal Hygiene Does

It would, of course, be absurd to say that everyone by practising personal hygiene could become strong and vigorous and filled with buoyant health. Unfortunately we are not all born with the same possibilities for strength and health and vigor. Some of us are, from birth, weaker and less vigorous than others. Personal hygiene cannot make up for deficiencies of this kind. But what it can do is to assist each individual to the fullest realization of the powers which he is capable of attaining. And in reality the handicaps of life result far more often from lack of care than from inborn defects and weaknesses.

The first step toward self-improvement in personal hygiene is to have an inventory of the body—a physical examination by a physician. In a thorough examination the physician will study every vital system of the body: the respiratory, circulatory, excretory, nervous, and digestive systems. He will inspect teeth, mouth, nose, throat, skin, and scalp. He will also consider weight, height, and posture. If he finds correctable handicaps—and at least 50 out of every 100 young people will show one or more—he will recommend the proper measures to overcome them. Such a general physical examination is needed once a year.

In addition, the routine of personal hygiene calls for a dental examination at least twice a year. In young people the teeth need especial attention, to avoid serious trouble in later life. (See Teeth.)

Physical and dental examinations must be carried out by physicians and dentists. But the remainder of personal hygiene lies in the hands of the individual.

Our Chief Food Requirements

One of the most obvious demands of the body is for food. But unfortunately the body does not tell us what sort of food shall be eaten: it simply demands enough of any kind to satisfy hunger. The selection of the proper foods and the development of the proper food habits must be guided by a knowledge of diet and of the workings of the digestive system. (See Food.)

Food is the sole source of energy for all activities of the body and mind. A good diet supplies not only energy but also all materials needed for growth, repair, and proper functioning of the body.

In brief, the requirements for a complete diet are

Enough fuel foods to give the body the energy it needs.
 Enough protein to replace that lost in the wear and tear of living scrivity.

3. Enough minerals to keep the bodily store adequate for good health.

4. Exorgin vitamins to prevent disease and to maintain good bodily function.

5. Enough roughage to allow the intestines to carry out proper elimination.

Fuel foods include the sugars, starches, fats, and proteins. Bread, potatoes, beans, macaroni, cereals butter, olive oil, milk, and all sorts of meats are fuel foods.

Proteins are found in meats, cheese, and milk, to a less extent in bread, cereals, and beans, and to a still lesser extent in other vegetables.

The minerals that the body needs are many, but all except two are supplied by any reasonable sort of diet. These two are lime and iron.

The best source of lime is milk. Milk should, for this reason if for no other, be a part of everyone's diet A quart a day is best, for most people. But it is not necessary to drink all of this quart; much of it may be obtained from soups, creamed vegetables, custards, and many other dishes, if they are made with milk.

Iron is needed to allow the body to make the red material which gives the blood its color and which has the important function of carrying oxygen. Foods rich in iron are molasses, beans, peas, shredded wheat, spinach, oatmeal, and prunes. Red meat also contains iron, but meat that has had the blood washed from it contains very little.

Vitamins and Roughage

When vitamins are absent from the diet, serious diseases such as scurvy, rickets, and beri-beri develop, when the vitamins are present but are inadequate in amount, growth fails to proceed normally and there is susceptibility to infection and loss of bodily vigor. Most of the needed vitamins are found in fruit, milk butter, leafy vegetables, and tomatoes. But there is one vitamin that the body makes for itself if the skin is exposed to sunlight. Where sunlight is lacking it is necessary to supply children with this vitamin, obtained in the oil from fish livers. (See Vitamins.)

The final requirement of the normal diet is roughage. Roughage is indigestible material, such as a portion of the pulp of fruit, of lettuce, and all other leafy
vegetables. If the diet contains only foods that are
digested and absorbed completely, such as eggs, meat,
butter, and sugar, there is no residue for the intestines
to move along and thus flush and clean themselves

Laxatives and physics of all kinds are poor substitutes for proper diet. When they are needed they are best taken only under the direction of a physician, for in some conditions they may be dangerous. Never should a physic be taken when there is a pain in the abdomen, unless the physician has made an examination and found the appendix to be normal. If the pain is due to appendicitis, a physic may make the disease worse and even cause the rupturing of the appendix

Diet and the Control of Weight

Many false beliefs and fads have grown up about diet. But sensible people disregard all fads. They select their diet with a knowledge of what their bodies need. Everyone who is interested in personal hygiere soon learns that likes and dislikes for this food or that have no place in the lives of those who truly seek good health. And besides, the liking for any food quickly comes with the eating.

The control of weight is closely connected with diet When one eats more of the fuel foods than the body needs the excess is stored away as fat and weight is gamed When too little of these foods is caten the fat of the body is used up and weight is lost. Young people who are of normal weight appear more resistant to certain infectious dispases than do those who are underweight But sometimes so much fat is put on that it is desirable to remove some. The only way it can be removed as by using up an evercase more energy than the food supplies

During dieting the body needs as much protein minerals vitamins and roughage as at any other time. The supply of these substances must be carefully maintained. The only change to be made in the diet is to reduce the amount of starches sugars and fats 'Dieting fade may be dangerous to health and up reducing weight it is all vays safest to have a physician outline the diet

How Many Meals a Day?

How often one should eat is a question raised in hygiene Frequently it is answered by saying that three meals a day is the proper number and that noth ing should be eaten between meals or before going to bed But newer knowledge on the subject and cates that the body is more efficient when food is taken in five or six meals Fatigue and irritability appearing in the late morning and late afternoon often arise from a need of food. Though custom and convenience support the three-meal program many nutrition specialists recommend the following schedule

I Breakfast M d morning lunch Noon meal 4. M d afternoon lunch Evening meal Bedtume hunch

But in following this accedule of five or six meals a day there is one important caution to be borne in mind The mid morning and mid-afternoon lunches are a part of the daily diet Because of them less food will be eaten at the regular meals Consequently these lunches must not be made up of candy and soft drmks and see cream sodas They should consist of milk sandwiches fruit sour and other articles that fit into the total daily diet

Many people condemn the lunch before going to bed But their behel in its ill effects is based upon the kind of food eaten and not the time at which it is eaten Pickles cheese sandwiches Welsh rareb t and other dishes hard to d gest are certainly not desirable just before going to bed. The articles chosen should be those that might be eaten with comfort for break fast warm milk and crackers custard toast fruit and the like

Vital Importance of Chewing No matter at what time food is eaten there is one positive rule of hygiene about the eating. The food must be chewed thoroughly and for two excellent reasons. First, after the food leaves the mouth all digestion is chemical (see Digestion) Digestive juices poured over it act upon it to dissolve it. The smaller the particles the easier is digestion. There are no teeth m the stomach or intestines and so when the food leaves the mouth there is no further chance for it to be divided into smaller particles

The second reason lies in the fact that one of the directive nuces is mixed with the food in the mouth This purce is saliva which digests starch. When the food reaches the stomach this digestion by the saliva continues for an hour or more before the stomach purces reach the food and stop the action of the saliva If the food is insufficiently mixed with saliva by chew mg the salivary digestion cannot take place and the

food tends to sour in the stomach. The old belief that water should not be drunk at mealtimes has as its only hasis this fact. Many per sons treat their food like pills and wash it down with a drink of water instead of chewing it Water in any quantity is perfectly harmless at meals provided it is drunk only when the mouth is empty and the water is not used to moisten or wash down dry foods. And milk we should remember must be treated not as a drak but as a solid food for it becomes solid in the stomach. To prevent undigestion milk must be

chewed by taking it in small swallows We know too that neither the saliva of the mouth

nor the d gestive juices of the stomach can be secreted well if the emotions are upset or if the mind is con centrating An important rule of hygiene says that for good digestion meals should be esten in peace of mind and comfort of thought Hence it is harmful to study at mesis or to scold and tease anyone Rather for best digestion meal time should be a time to joke laugh and carry on pleasant conversation

Allerey and Food Polsoning

Certain foods which most people can est and enjoy cause illness in occasional individuals. They become nauseated they may even develop a skin eruntion called haves This rare disturbance (called allergy) is closely related to hay fever But there is no ground for the belief that certain articles of food cause indigestion if they are mixed together. Thus many persons refu.e to drink lemonade and milk in the same meal or eat ice cream after lobster. The fact is however that any food that can be eaten and digested in com fort can be taken without danger in the same mealor even in the same dish-with any other food that can be eaten and digested in comfort. Food mixtures upset the stomach only when one or more of the ingre dients is indigestable or spealed

Food possoning results when the food eaten is speiled infected with breteria or contains a poisonous substance Thus toadstools eaten by mistake for mushrooms cause food poisoning because the toad stools are themselves poisonous Again food that has sporled contains not only bacteria but the poisonous chemical substances that result from the action of the hactern But by far the commonest type of food poisoning results from human contamination. There are certain dangerous bacteria that may sometimes be present on dirty hands. If the hands touch the food, the food is contaminated. If the food is eaten, food poisoning results. These bacteria are destroyed by heat. Therefore this type of food poisoning comes most often from cold foods that require handling, such as sliced meats, sandwiches, and deviled eggs.

Because of the dangers of food poisoning, great care must be taken in handling food. The kitchen must be scrupulously clean and free from flies; the icebox clean and neat. Only healthy people should handle or serve food and their hands should be washed and their finger-nails cleaned before they touch any food or even any dishes. And finally, the dishes should not only be washed to make them look clean, but scrubbed and scalded in hot water to remove bacteria and then thoroughly dried.

Another type of poisoning may result from the use of alcohol or coffee or tobacco. Alcohol is an anesthetic. It acts on the body in the same way as does the ether used to produce unconsciousness for surgical operations. Coffee contains a drug called caffein, which stimulates and irritates the nerves. Tobacco contains a drug called nicotine, that also acts on the nerves. All three of these drugs, however, are far more harmful to young people than to adults.

### Facts About the Air We Breathe

Of equal importance with food in supporting life is the air we breathe. In the lungs the blood takes part of the oxygen from the air and in turn puts into the air a gas called carbon dioxide (see Respiration). This is the same gas that forms bubbles in soda water and ginger ale (see Carbon Dioxide).

At one time it was believed that what is called "bad air" in poorly ventilated rooms resulted from the continual removal of oxygen and the continual addition of carbon dioxide by people breathing in the room. We know now that oxygen and carbon dioxide pass through plaster and brick and wooden walls so rapidly that there is never any danger of the air in a room containing too little oxygen or too much carbon dioxide.

Regarding oxygen in the air, therefore, the rules of hygiene have little to say. But they have much to say regarding other substances in the air. Dust, bacteria, pollen, and poisonous gases may all make air harmful to breathe.

All air contains some dust. The small amount normally present is removed in the nose and, to a less extent, in the windpipe. These passages thus protect the delicate structure of the lungs from irritation by dust. If breathing is through the mouth instead of the nose, part of this protection is lost.

When there are large amounts of dust in the air the nose and throat themselves may be irritated. The air in houses usually contains far more dust than does the outside air. Removing dust thus becomes a part of hygiene in the house. One of the most satisfactory ways of reducing the dust is to use a vacuum cleaner instead of a broom. The cleaner removes the dust; the broom stirs it up.

The presence of poisonous gases in the air is a far more serious matter than is the presence of dust. In the house there are two main sources from which dangerous gases may come: the coal furnace or stove, and the gas stove, gas jet, and gas water heater. In the garage is a third source—the automobile.

Automobile exhaust gas is very poisonous. It contains carbon monoxide (do not confuse it with carbon dioxide mentioned above). An automobile should never be run in the garage for a single instant unless the doors are wide open. Many lives have been lost

because of ignorance of this fact.

The same dangerous gas may come from the furnace or coal stove. Carbon monoxide is nearly always present in coal smoke, especially when the fire has been banked and the dampers closed. If smoke finds its way into the house through a faulty flue or chimney, or from a crack in the firepot of the stove or furnace, it carries with it the carbon monoxide. Good hygiene includes the regular inspection of all household equipment and the immediate repair of any defects that are found to prevent such an occurrence.

This same carbon monoxide is also the poisonous part of illuminating gas used for cooking, heating, and lighting. If illuminating gas escapes unburned, its dangerous carbon monoxide finds its way into the air of the rooms. But illuminating gas is harmless when burned, and can be used with perfect safety by those who know its dangers and guard against them. There are a few special don'ts that everyone should know:

 Don't use a rubber tube on any type of gas fixture. The hose is easily pulled off, allowing the gas to escape.

2. Don't allow the cocks on the burners of the stove to become loose so that they may jar open.

3. Don't allow a small child to play near a gas stove. He may in ignorance turn on the gas.

4. Don't allow food or water to boil over on the stove. It may put out the flame but it does not turn out the gas.

The Real Purpose of Ventilation

The air of all rooms, as was said above, has plenty of oxygen, it never has a harmful amount of carbon dioxide, and it rarely has in it the dangerous poisonous gases. Yet for good hygiene it is always necessary to ventilate rooms in order to keep the air fresh (see Heating and Ventilating). This freshness has nothing to do with the chemical nature of the air or with breathing. "Bad air" is air that is too hot, or too moist, or too dry; and especially it is air that is too still. Air that is still and warm does not allow the body to give off its heat in comfort. Still air is depressing; moving air is invigorating. Moreover, when there is no movement the air tends to gather in layers, with the hot air near the ceiling of the room and the cold air along the floor. This condition is unhygienic.

Poor ventilation resulting in "bad air" occurs mainly in the winter time. In our northern regions it is necessary to close the windows and to heat the air of the rooms. Often the air is overheated, dry, and still. With careful attention to the heating plantand that is a regular part of the hygiene of the house the overheating can be prevented. The proper temperature for heated eir is a matter of opinion. But most authorities agree that 68° F is as warm as it should be If the air can be well moistened the temperature may be kept as low as 62° or 65° Older people require warmer air than is comfortable or even healthful for young and ective people

Bedrooms should be kept cool at night and well ventilated by means of a partially opened window. In the past it has often been a fad with many people to keep the bedroom cold and with a breeze-often a gale-blowing through it from wide open windows This condition while harmless to those in vigorous health may be harmful to those who are ill or even to those who are troubled with frequent colds. Cold air puts a hurden on the nose end throat. Fresh air is needed in the bedroom but ventilation-like everything else in good hygiene-should be in moderation.

It is a common belief that drafts of cold air wet lect, and wet clothing cause people to 'catch cold ' Certainly any of these conditions will make a cold much worse, they will also make the muscles stiff They are to be avoided under all circumstances But a cold is an infection. Infections though they may be made worse, are not acquired by getting the feet wet They are acquired from other people who have colds Arctic explorers do not develop colds so long as they sfay away from other people

How to Avoid Colds

Colds are epread by germs cerned in minute droplets epread in the air during coughing and sneezing By keeping the air in motion good ventilation helps to disperse these droplets and thus aids in preventing the spread of colds Colds are rarely caught' out of doors but they are frequently 'caught in poorly ventilated rooms or where people come in close contact

with one another as in trains, schools and theaters The germs that cause colds may be spread in other ways by shaking hands with a person who has a cold, by using his handkerchief by drinking from his unwashed glass and, in short by touching or using any article that he has recently touched or used To avoid colds avoid people who have colds

There are certain definite rules of hygiene to be fol lowed by those who have caught cold

1 Avoid going near other people. Do not spread your . Go to bed on the first sum of the cold and stay there

until it is over This is the safest and wisest treatment for a cold It is the only measure that may shorten the length of the cold And it is an almost certain method of preventing the cold from spreading deeper into the threat and lungs and

causing brenchitis or pneumonia

3 Avoid getting the skin wet or chilled 4 Take the temperature with a mouth thermometer twice

each day If there is fever call a doctor at once If these simple rules of hygiene were followed there would be far fewer colds and, what is more unportant, far fewer cases of bronchitis and pneumonia

One of the dangers of any cold is the possibility that the infection in the nose may be forced up the minute tube (the Eustachian tube) that leads from the throat to the ear (see Ear) Infection of the ear may follow

Not all cases of ear infection come from this cause, but many do And many of these could be avoided by a supple rule of hygiene in blowing the nose Never stop up both sides of the nose in blowing, always leave one open If both sides are closed the blowing may force the infectious material into the ear

If the ear canal becomes filled with wax a phy sician should clean it But it is dangerous to attempt to do so at home with a hairpin or the rolled up end of a towel for the way may be pushed back into the canal and strike against the head of the drum. There is an excellent and sureastic German proverb on the care of the cars It is 'Never put anything smaller than the elbow in the ear" This caution however. does not mean that the outer car should not be washed

Hygiene of the Eyes The rules of hygiene for safeguarding the eyes are much more extensive than those for the ears The even are the most unportant of the sense organs (see Eye) We normally depend upon them for more than 80 per cent of our perception of our surroundings. Any defect in the eyes that interferes with good seeing is thus a serious bandicap to all work and pleasure. Moreover, the atraining to see well with defective eyes harms them still further and causes headache and unitability Defects of the eyes can usually be corrected Therefore the eyes should be examined and the vision tested once each year by an eya specialist

Even when the ever are capable of seeing well they are often forced to work under conditions that atrain and mure them. The eyes espenially those of young people may be strained by reading small type. In all reading the head should be held up straight with the book supported upright, not laid open on the desk Rest the eyes frequently by closing them or looking off into space for a moment

Good seeing requires good lighting Poor lighting etrains and injures the eyes Use daylight when possible for reading and writing and sewing. When artificial lighting is necessary, the arrangement of the lights becomes an important part of hygiene

Never read or write or sew in a dim light or in a place where shadows fall across the work. Always use a bright light but carefully avoid glare. There are two kinds of glare, both are harmful to the eyes Direct glure results when an unshaded light shines directly into the eyes Indirect glare results from the reflection of the light on the page of the book There is a simple test for the harmful indirect glare. With the book held m position for reading move a small hand murror back and forth across the page. If an mage of the light bulb is seen in the mirror, indirect glare is present The book or the light should then be moved until the image of the light can no longer be seen in the mirror

Good lighting in the house not only saves the eyes from strain but helps to prevent accidents Many accidente result from falling over furniture or other obstacles m dark halls and passageways. And many result from falling down dark stairways Light-colored

wall and ceiling decorations help toward better illumination. Whitewashing the cellar serves this same purpose and in addition makes it much easier to see dirt that should be removed.

Any injury to the eyes, any infection, even any redness, should be treated by a physician. The eyes are far too valuable to risk any "home treatment."

Care of Skin and Scalp

In contrast to the eyes, the skin of the body needs "home treatment" every day. This treatment is washing. Cleanliness is the most important step not only toward good health of the skin but toward good complexion as well. The skin of the whole body needs a daily cleansing with warm water and soap. The skin of the hands and face and feet need even more frequent bathing.

It is important to dry the skin thoroughly after washing. And this is particularly true in the winter time, for then wet skin chaps and roughens.

Many girls and women use cosmetics on their skinpowders, creams, and lotions. Chapped skin is soothed by putting grease on it, but the regular use of grease makes the skin tender so that it chaps easily; it may also cause pimples in young people. There are many absurd beliefs about the "beautifying" effects of cosmetics, derived largely from advertisements. The facts are that the skin cannot be fed or renewed from the outside; this can be done only from the inside. Cold cream is merely grease; vanishing cream is a sort of soap; and face powder is a dust made of starch or crushed talcum rock. Some cosmetics are actually poisonous. Real beauty of complexion comes from good health and cleanliness. Cosmetics are used mainly to cover up the blemishes that come from lack of good hygiene of the skin.

For the hair and scalp the best "tonic" is cleanliness. They should be washed at least twice a week. There is an old superstition that washing the hair harms it by taking out the grease. In reality the only harm that can come from washing is from leaving soap on the hair, from too little rinsing, or from failure to dry the hair and scalp thoroughly.

### Effects of Poor Posture

Good posture, like good complexion, is a matter both of beauty and of health. The human body is not handsome when the shoulders are slouched and sagging, the back bent, and the neck thrust forward. Equally unbecoming is a slouching posture in sitting. When we see people with these bad postures we get the impression that they are tired, or lacking in energy, or weak. Sometimes it is fatigue that causes the bad posture, but more often it is carelessness and poor habits of hygiene. Moreover, bad posture affects health. Muscles are pulled and strained; the back and legs ache; and sometimes the organs in the abdomen are pushed out of place.

Clothing as well as posture plays a part in hygiene. Clothing is intended to keep the body warm, but not too warm. Therefore in winter weather it is best to wear clothing suited to the indoor temperature of our

heated rooms and provide plenty of wraps, coats, leggings, and overshoes to use when going out of door. The clothing next to the skin should always be kented dry. The underclothing should be changed frequently—daily is best—for it becomes covered with bacteria from the skin. Skin infections and unpleasant oder may result from soiled underclothing. The clothing should be loose. It is best to support it entirely from the shoulders.

This warning against tightness applies especially to shoes. Because they are stiff and firm, misfitted shoes may deform the feet. The shoes for young people who are growing need especial attention. Sometimes they become too small for safety even before they are worn out. For the best foot health, shoes should have low heels and broad toes. They should be of soft leather and ventilated to allow evaporation of perspirating

Importance of Exercise and Sleep

Exercise is an important part of good hygiene (\*\*). Physical Education). If exercise is avoided, the body gradually loses its reserve of strength. The muscles become soft and flabby, and the vital organs do not carry on their functions as well as they should. Good exercise does not mean violent exercise but regular exercise. Endurance contests of any kind may be harmful to boys and girls under the age of 16 or 17. It is far better to develop a sound body for a long life than to win a few races and swimming contests in early life. Do not make work out of the daily exercise; make it a pleasure. Walking, dancing, tennis, swimming are good exercise—and so are sweeping and bed-making.

Sleep is more than a rule of good hygiene; it is a necessity. But the right amount of sleep is a matter of hygiene. Some people need more sleep than others, but a rule that suits most is:

I to 4 years, 12 hours of sleep 4 to 12 years, 10 hours of sleep 12 to 16 years, 8 to 10 hours of sleep

No one can work or study or play well when he is tired and irritable from lack of sleep. For the hygies of sleep the first requirement is regular hours for sleep ing. The other requirements are: a comfortable bed enough but not too many bed covers, good but reviolent ventilation, and a quiet bedroom with wir-

dows shaded against the morning sun-

Personal hygiene does not end with the care of the body alone. Good mental and emotional habits are just as important as good health (see Mental Hygienel. Some persons are fortunate in having a warm and cheerful disposition that makes life easy for them and for those about them. Such a disposition is a gift even more precious than physical strength and beauty. Others are handicapped by dispositions that are irritable or sullen or indifferent. Such persons can gift toward overcoming their handicaps if they will make persistent efforts at self-control and self-irprovement (see Personality).

For mental health, in the home and in all situstices of life, everyone must give as well as take. Each must be considerate of others as well as of himself.



Outlis is a unrery school in B ooklys learn her to bathe a beby. They are grentis ag with a doil 2 A nurse aboves to continue and the day and the school of the uncertaken that is a bear sometic and the day affects to be to make a bed of the school and the day to be an outle with a bed of the school and the day to be an outle to this 3 A titled a beby to bathe and oil it. Thus are shows that a thermosure bound to be day to be an outle to this 3 A titled a beby to bathe and oil it. Thus are shown that a the armount of the school and the school and the school are the school and the school and the school are school and the school and the school and the school are school as the school are school and the school are school as the school are school and the school are school as the school are school are school as the school are school are school as the school are schoo

# The GUARDIANS of the PUBLIC HEALTH

HEALTH DEPARTMENT. When one part of the human body suffers, the whole body is likely to be affected. In the same way if sickness or unhealthful conditions prevail anywhere in a country, all the people may be threatened. An impure water supply may start an epidemic of typhoid fever; one person with diphtheria may infect hundreds of others; chemical fumes may sap the health of the workers in an entire industry. To protect people against such dangers is the duty of the national, state, and local health departments.

Organized supervision of public health has progressed along with the advances in medical science. The movement began in the latter half of the 19th century when scientists found that most of the plagues that scourged the world were caused by germs, and could be controlled by scientific procedures (see Disease). The first emphasis was on cleaning up the community. Among the measures undertaken were the following: sanitary sewage disposal. purification of water supplies, extermination of flies, mosquitoes, and other vermin that spread disease, quarantine against germ carriers, and inspection of milk and other foods. As a result diseases that could be controlled by environmental sanitation, such as cholera, bubonic plague, typhoid, typhus, and yellow fever, have almost disappeared from the country or, like malaria, have been greatly reduced. An outbreak of one of these diseases indicates a failure of sanitary engineering and brings public health experts to clean out the source of infection.

The Results of Preventive Medicine

One of the great allies of the public health movement has been preventive medicine, with its use of vaccines and serums to render individuals immune to many of the communicable diseases. While the person who is vaccinated thinks primarily of his own freedom from danger, his immunity is in fact a matter of public concern. It prevents him from becoming an agent in the spread of disease. Smallpox epidemics are a thing of the past because the disease can make little headway in a community where most persons have been vaccinated against it (see Vaccination). The spread of diphtheria has been checked by the general use of the toxoid preventive and the antitoxin cure. (See also Disease; Serum Therapy.)

Tuberculosis was the chief cause of death in the United States in 1900. By 1935 it had dropped to seventh place. It still leads the diseases as the cause of death among young adults. Accidents, however, cause the most deaths between 15 and 34 years of age. Influenza is one major epidemic disease that has not been controlled by medical science and public health measures. Antibiotics and serums have been helpful in treating it, and research continues.

New Standards of Public Health

Health departments have controlled the communicable diseases mainly by using the police powers of

government. With the aim of protecting the lives of the whole people, they place certain restraints on the freedom of individuals. They forbid a householder or a factory owner to dump waste in a stream, or they restrict the movements of persons infected with disease gorms. When they attacked the problem of tuberculosis, they found that preventive methods, such as forbidding the sale of tuberculous milk, were not enough. It was necessary to educate people in hygienic ways of living, in the importance of regular physical examinations to detect the disease in its early stages, and in getting proper treatment when it was discovered.

The great success in the fight against tuberculosis encouraged public health officials to extend their research and educational programs to noncommunicable diseases such as chronic ailments and nutritional disorders. No longer is it their sole aim to protect society from the spread of infections. Their new ideal is improved personal health for every citizen. That this will lead to a stronger, more productive nation is indicated by the estimate that every day of the year some six million people in the United States are too sick to go to work.

By the 1950's the life expectancy of an American baby at birth had risen to about 682 years, a gain of nearly 20 years since 1900. The average rose because fewer people die in infancy and childhood. Maternal and child welfare work has helped to bring this about. The presence of more old people in the population has now focused attention on diseases that attack the middle-aged and the old-cancer, diabetes, mental disorders, afflictions of the heart, kidneys,

and blood vessels.

Work of Local and State Health Departments

Local departments do the greatest share of public health work, since they are closest to the people. County units and the district units that serve two or more counties have increased greatly in number and in service to rural communities since 1930. The scope of the work of city health departments has also widened enormously in this period. Their sanitary officers test the water supply and check on sewage disposal (see Water Supply; Sewerage). They visit retaurants, packing houses, and other places where icod is handled to find out whether the equipment is clean and the employees healthy. Department veterinarians test the cows from which the city milk supply comes and examine the milk and milk-handling equipment (see Dairying). Inspectors follow up complaints of insanitary housing conditions, and may order that substandard buildings be demolished. Engineers examine building plans to see that they meet with sanitary ordinances. Control of smoke, fumes, and odors; inspection of summer camps and swimming pools; heating, ventilation, and sanitation in factories; local programs for control of vermin—these are also among the tasks of city health officials.

#### How Science Is Conquering Disease

#### Infectious Diseases of Childhood in United States





1940 11++1 1950 14

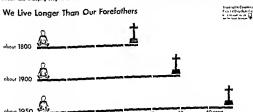
blue from dishtheria

Each complete symbol represents I death per 100 000 population

black from whooping cough

green from measles red from scarlet fover

Nawhere has med cal science made greater gains than in its war against communicable distasses. Public health work in Immunisina children has helped. The great number of these search is supported by the mass of figures of the high. Notice third sighthering the distribution in 1900, course likes than one death in 200 000 population (one hoft symbol) in 1950. The hold from measier was The same and whooping cough killed obout one in 100,000. Deaths from scarlet fever in 1950 were too few to be indicated



The steady increase in life expectancy in the United Stoles is revealed by this graph hased on Nasonal Office of Vital Statistics are steady howeve in life expectancy in the United States in terrelated by the group hasted on that and Othics of Virol Sola into Sports for the white population. A white child been baddy may expect to lave the best-watering for the Sports for the white population. A white child been baddy may expect to lave the best-watering for the property of the Sports for the presentation, the property of the sports for the presentation, shouldness, and consider a sport of the sport of the sports for the presentation, shouldness, and consider a sport of the sports of the sports

The medical work of city health departments is carried on by a corps of physicians, nurses, and laboratory technicians. They investigate reports of acute communicable diseases and quarantine the homes where cases are found. They maintain hospitals for segregating patients when necessary. They operate laboratories for diagnosing infectious diseases and may supply serums for their treatment. One example of the work done by city health departments is the examination of dogs suspected of having rabies (hydrophobia). If the dog is found to be infected, it is killed and the department furnishes rabies scrum to whatever persons the dog may have bitten.

Infant Welfare and School Activities

Child welfare activities may include clinics or conferences where mothers go for regular examination for themselves and their babies. Nurses instruct the mothers in the proper care of infants and visit thein at home to see that the instructions are being followed. Vaccination against smallpox, inoculation against diphtheria, or other treatment may be given.

Health department nurses and physicians cooperate with the schools in examining pupils for physical defects or ailments, including bad teeth or poor evesight, as well as in giving vaccinations, inoculations,

and tests of immunity.

The bureau of vital statistics keeps a registry of births and deaths. The records showing the causes of death are valuable guides to future discoveries and improvements in the field of public health.

State health departments are responsible for enforcing the health laws of the state and they are usually empowered to issue whatever additional regulations may be needed to make the laws effective. They are active in education and research and they may do for the entire state any of the tasks described as part of local programs.

The inspection of food dealers and processors and the enforcement of pure food and drug laws are frequently the duties of the state department. Where water supply and sewage disposal involve regions beyond the jurisdiction of the city, the state department

takes charge.

Many public health services are performed by branches of government other than health departments. A city department of streets may collect garbage. A state welfare or public charities department may maintain tuberculosis sanitariums. The Department of Labor may inspect factories to maintain hygienic working conditions. Examining boards may license physicians, dentists, druggists, and nurses.

The United States Public Health Service

Founded in 1798 to establish hospitals for merchant seamen, the work of the United States Public Health Service has expanded as new needs have arisen. Since the states could not defend their borders against disease from abroad, the Public Health Service was given the task of maintaining quarantine at ports of entry. Its officers examine immigrants and inspect passengers and crews of vessels, trains, busses, and airplanes arriving from foreign countries. They guard

against rats and other disease-carrying vermin lating from ships (see Rat). Reports from representtives in foreign countries give warning of epidem; that might be carried to the United States.

The Public Health Service supervises the manufacture and sale of biological products used in medicas to insure their purity and strength. Other medical and drugs are regulated by the Food and Drug Admiristration, which like the Health Service is part of the Federal Security Agency (see Pure Food Ism.).

The Service conducts research at the National Institute of Health and in field laboratories. Nutrtion and methods of control of communicable discisare among the problems it has investigated. It help states and counties to establish and operate health services, and it makes nation-wide surveys of needs in health, sanitation, hospital facilities, and the lie It develops standard ordinances and sanitation code

The Service also operates hospitals for merchant seamen and for other persons for whom it is response sible, including drug addicts and lepers. It advisheads of federal departments and agencies in state lishing preventive medical programs for federal enployees, since a law making such programs possible was passed by Congress in 1946.

Mental Health and Vital Statistics Added

Other 1946 legislation extended United States Pub he Health work. The National Mental Health An provided for an institute to conduct research in the causes, prevention, diagnosis, and treatment of mertal and nervous diseases. It provides finances to research in this field by institutions and individuals, and aids in training psychiatric and other person nel to care for mental patients.

Vital statistics activities formerly handled by the Bureau of the Census were transferred to the National Office of Vital Statistics of the Service in 1946, h collects, analyzes, and publishes statistics on births, deaths, marriages, divorces, communicable diseases, and other data. It also publishes health information. In 1949 the Service set up a Radiological Health Unit to work out controls of hazards from radiation.

International and Private Health Agencies In 1948 the United States joined the World Health Organization, an agency of the United Nations. of the many health problems facing the WHO, it has given priority to action on malaria control, maternal and child health, tuberculosis, venereal disease, nutrition, and environmental sanitation. The WHO has headquarters in Geneva, Switzerland, and regional offices in various areas.

Privately supported agencies also carry on public health work. They include the Red Cross, the National Table tional Tuberculosis Association, the American Social Hygiene Association, the American Society for the Control of Cancer, the American Heart Association the National Control of Cancer, the American Heart Association and the National Committee for Mental Hygiene, and the National Foundation for Infantile Paralysis. The Rockefeller Foundation and other philanthropic organizations izations devote themselves to health problems in many parts of the world (see Foundations and Charities).

### The HEART-A Living PUMP for BLOOD

HEART AND CIRGULATION The human heart is the most wonderful amp in the world It keeps the blood acoving through our bodies continuously luring life It is no larger than a man's at yet it pumps more than 4 quarts of lood to the body a munute It beats from we to three billion times in an average if Its automatic and can repair itself

The pumping goes on without stopping lay or might as long as we lve It must go on, because the body tassues cannot live without a constant supply of fresh blood. The blood takes ovygen from the lungs to all the cells of the body and carries carbon dovide from these cells to the lungs. The blood delivers deslit of the lungs. The blood delivers to other parts of the body It carries substances that fight disease germs and others that regulate activities of the body the organs (see Blood)

ouy a organs (see 191000)
Circulation of the Blood

The heart is located in the chest at the enter of a network of tubes called bloot sessil. They carry blood from the heart to all the parts of the body and bring it back after it has served the insues. This movement of the blood between the heart and the ussues acalled the arculation. The heart and the blood vessels together failth and the blood vessels the blood vessels are called trans are called remark.

Blood containing a fresh supply of ovy gen leaves the left aids of the heart in a big suched vessel called the aoria. This is the largest artery. It sends branches to the heart itself to the head and to the arms. Then it turns down behind the heart group out branches to the naternal organs. Finally it divides mot two arternes that carry blood to the lego and feet.

and feet

Branches from the aorts divide mto

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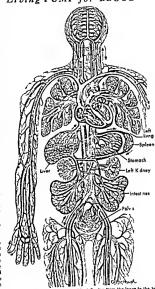
Endet for a feet and the feet from the

smallest artenes the blood flows mto

capillanes These are vessels so small they cannot

be seen except through a microscope. They branch to form a network throughout the fusives. All exchange of materials hetween the blood and body cells takes place through the thin walls of the expillaries.

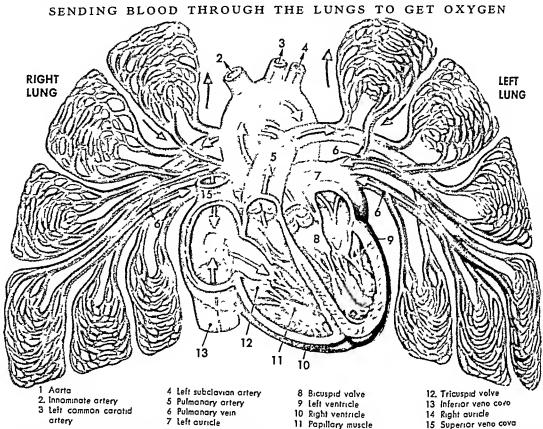
At the end away from the arteries the espillaries unite to form small veins. There the blood begins its return trip to the heart. It has given up most of



In this dagress of the body is shown in red. It has been freshly charged with any sed then to the body is shown in the better the best flowing in the best shown itself the best shown in the best flowing from gen most of its owygen is the to save Purple and cates partal circulation from general states that the best it be been it brage food me the decrease as fer farther charges and for storage outlineeded.

annot its oxygen and taken on carbon dioxide. The veins that of mite again and again to form larger veins. Finally the blood reaches the right side of the heart through taken two box veins, the superior and inferior vein cata.

Patrance of the blood into the right side of the heart completes its trip through the systems (body) circulation Before starting out again the blood must get oxygen from the lungs. It does this through



The heart receives blood from the body (bloe) in the right suricle (14), and sends it to the lungs. It comes back charged with oxygen (indicated by red) to the left suricle (7). The movement through the lungs is called the pulmonary circulation. In the picture, the heart is relaxed and filling with blood. In a moment it will contract and the ventricles (9 and 10) will force blood out to the lungs and the body. To keep blood from entering the suricles, muscle extensions attached with cords to the cusps valves (8 and 12) will hold them closed (Some parts of valves have been cut away, to give a good view into the heart.)

the pulmonary circulation. The blood leaves the right side of the heart in a pulmonary artery. This divides to go to each lung. In the lungs the blood exchanges carbon dioxide for oxygen through the walls of many capillaries. Then it flows to the left side of the heart in pulmonary veins. From there it starts out again to the body through the aorta.

### Structure of the Heart

The heart is a hollow muscular organ with openings into the arteries and from the veins. In the diagrams of the circulation the heart is opened out to show how the blood passes through it.

The heart is about 3½ inches wide at its broadest part, 5 inches long, and 2½ inches thick. It is suspended in the chest cavity by the large blood vessels, with its base resting on the diaphragm. It extends farther to the left than to the right. A sac of fibrous tissue (not shown in the diagrams) encloses and protects the heart. Its name is pericardium (literally, "around the heart").

An interior wall divides the heart in half. Each half has a small upper chamber (auricle or atrium) and a large lower chamber (ventricle). On each side blood enters the auricle and passes through a one-way valve

to the ventricle below. It passes from the ventricle through a one-way valve into the artery (pulmonary on the right, aorta on the left). The four-chamber arrangement lets blood with oxygen pass through the heart without mixing with blood from the body.

The valves between the auricles and ventricles consist of tiny triangular segments of tissue known as cusps. The one on the right has three cusps (tricuspid valve), and the one on the left two (bicuspid valve). The valves between the ventricles and arteries consist of three semicircular leaflets. These give them the name semilunar (half-moon) valves.

### How the Heart Pumps

The heart pumps by alternately contracting and relaxing. Contraction begins at the top, in the auricles, and passes downward to the ventricles. It is followed by an instant's rest. The diagrams on the next page illustrate this action and show how pressure forces the one-way valves to open and close.

The walls of the auricles are thin. The walls of the ventricles are thick and powerful. The action of the heart tells us why. The ventricles have to pump blood out of the heart. The auricles only have to force it into the ventricles. The walls of the left ventricles.

tricle are thicker than those of the right. This ven tricle has to pump blood all through the body while the right ventricle sends it only to the lungs.

Contraction or systole (sit to-to) and relaxation or diastole (di-dis to-to) make the beat of the heart. The average rate for adults during rest is 70 beats a min ate but normal rates vary greatly

What Makes the Heart Beat?
The heart like other muscles works because it receives impulses from nerves. The impulses that make

it beat come from nerve cells and fibers which are complete in the heart with no outside connection

Thus the heart is truly automatic.

Impulses that regulate the rate of the heartbeat come through two pairs of nerves one from the spinal cord (the accelerators) and one from the medulls (the

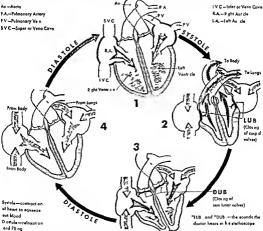
solubitors or brakes) Through nerve centers where they originate these nerves receive impulses from other parts of the body and pass them along to the heart. Fear for example slows down the heart. Exettement and exercise both make it heat faster.

How Arteries and Veins Help the Heart Arternes have thack elastic walls Blood enters the sorta m spurts from the left ventrale. The walls of the sorta bulge with each spurt and recoil or con tracts behind it. This motion sends the blood forward in waves adding force to that supplied by the heart The wavelike flow continues through all the arteries

It accounts for the beat of the pulse

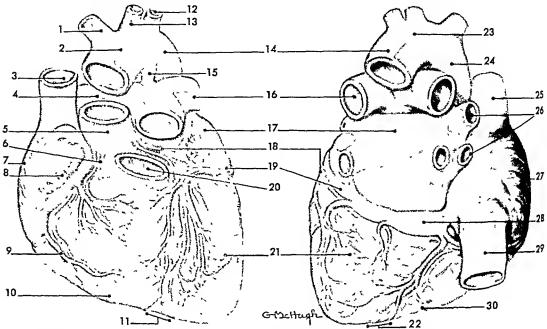
By the time the blood reaches the capillaries the
spurting motion has spent itself. The blood flows
slowly through these microscopic vessels. It gathers

### YOUR HEART DOES THIS ABOUT 70 TIMES A MINUTE



This series of disgrams shows how the heart summer. I The ear to the territories as the control of the territories as the territories as the control of the territories as the them terce. The verbrices control of Pressure of bleed sea them terce is the control of the territories are the control and the control of the territories of the territories are the control of the warf into the arteries to open Blood aputs and the arteries to pressure the control of the control 3 The ventricles color and pressure in them falls Pressure of the blood just pumped into the arterner clears the annihous valves Pressure of blood in the service ages the complet valves and blood flows left the ventricles are the entire hear into the extractive sets are not rectricted as the entire hear into the extractive sets annify. Then contraction starts exam.

### THE HEART JUST BEFORE IT BEGINS TO CONTRACT



- 1. Innominate artery
- 2. Aortic arch of the aorta (5); a portion is cut away to show the vein behind
- 3 Superior vena cava
- 4 Pight branch of pulmonary ortery
- 5. Ascending oorta
- 6 Right coronary attery
- 7. Pight atrium
- 8. Right auricle
- 9. Anterior cardiac vein
- 10 Right ventricle

- 11. Anterior longitudinal sulcus, also, location of septum between ventricles
- 12. Left subclavian ortery
- 13 Left common corotid artery
- 14 Descending oorto
- 15 Arterial ligoment (before birth, the arterial duct)
- 16 Left branch of pulmonary artery
- 17. Left otrium
- 18 Left coronary artery
- 19. Great cardiac vein

- 20. Pulmonary ortery
- 21. Left ventricle
- 22. Posterior longitudinal sulcus
- 23 Aortic orch
- 24 Ascending oorta
- 25 Superior vena cava
- 26. Pulmonary veins from right lung
- 27. Right ouricle
- 28. Coronary sinus emptying in right ouricle
- 29. Inferior vena cava
- 30 Right ventricle

These drawings show the heart from the front (left) and the back (right). The anricles are full and ready to contract. Note that anatomically the auricle actually is a fisplike pouch at the top of the atrium. It has become customary, however, to call the entire chamber the auricle. As these pictures show, the main blood vessels are very large. The coronary arteries on the surface of the heart seem of the branches throughout the heart muscle. The heart recurves its nourishment through capillaries that connect these branches with the cardiac veins. The latter return the blood to the right auricle.

speed as several capillaries empty into each vein. The veins are relatively larger than the arteries, with thinner walls. Pressure from any kind of movement squeezes them, forcing the blood to flow faster. Veins contain one-way valves at frequent intervals to keep the blood from flowing backward.

### The Electrocardiogram

The heart develops electric charges as it beats, because, like all muscle, it is electrically negative in its contracting portion and electrically positive in its relaxed portion. This current can be registered from the exterior of the body.

The electrocardiograph is an instrument for recording the current generated by the heart. It makes a tracing known as an electrocardiogram. This shows the beat of the heart as a series of up-and-down waves. It helps doctors detect irregularities in the heartbeat which may indicate disease.

### The Heart May Get Out of Order

The chief cause of heart trouble in young people is rheumatic fever, in which infection may destroy tissue in the valves or heart muscle. Among older people, the leading causes are high blood pressure and hardening of the arteries. These conditions force the heart to beat against pressure. In hardening, the coronary arteries, which supply the heart, are affected. Narrowing or a blood clot (thrombosis) may then deprive the heart muscle of necessary ovigen.

The heart has wonderful powers of recovery against disease. It may enlarge to overcome the handicap of leaking valves or an increase in blood pressure. It can repair itself by replacing diseased tissue with scar tissue, and work almost as well as ever.

The rules for care of the heart are the rules for healthy living. A balanced diet supplies the heart muscles with necessary food elements. Moderate exercise tends to keep it in good condition. Excesses of eating or exercising and emotional upsets put an extra burden on it. Sufficient rest and sleep are necessary to give the heart periods free from strain. Excessive worry not only disturbs the heart rate and raises the blood pressure but interferes with rest.

### HEAT-WHAT It IS and HOW It BEHAVES



Cheerful Fire Proves the Value of Heat to All Living Bennet

HEAT All living things must keep warm in order to stay slive During the summer plants and sumals profit from the warmth Plants grow mpidly, and produce fruit and seed. Animals get fat, and their young ones grow rapidly. Human bemgs grow crops and enjoy life out of doors

When winter comes living things must take special measures to stay alive. Many plants just die, leaving seeds for the next year Others shed their leaves and become dormant Animals have many ways of getting through the cold months. Human beings wear warm clothes and heat

their buildings These differences between sum mer and winter living show the great importance of heat for supporting natural life Heat also provides much that men need for hy ing in modern ways. Fire in boilers produces steam for running engines and generating electricity

power runs railroads, factories and ships. Heat from burning coal and oil keeps buildings warm in wanter Heat is used to smelt metals and is used to help make numerous other products

Heat can destroy as well as support life Fires cause immense damage and kill and miure many hying things every year. Too much summer sun can cause sunstroke and give painful sunburn

Principal Sources of Heat Where do hving things get this valuable, life-supporting heat? The principal source is the sun

Without heat from the sun the SOURCES OF HEAT temperature would be hundreds of

degrees below zero. The sun s heat makes winds and rain

The sun also provided all our common fuels Coal and petroleum came from the buried remains of plants and sumals that once lived with heat from the sun. These fuels give men their commonest way of



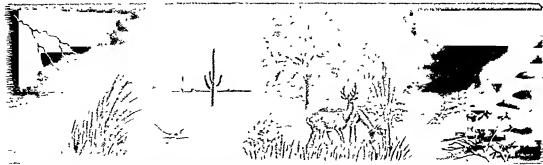






not The sun slao has provided feel for siving t Heat can be generated by friction such as we heat Still conther source is stomic energy

### SOME OF THE WORK HEAT DOES IN NATURE



The sun's heat draws water into the air and also causes winds. In many places, storms release water as rain or snow. In others, the sun dries the land into a desert. Where rainfall and the sun's heat are sufficient, green plants thrive and provide food for many animals. Other animals prey upon the plant eaters. When the sun's heat lessens in winter, men must huild fires to keep warm.

getting additional heat—that is, by burning something in a fire. Burning is a form of chemical action. It unites oxygen from the air with carbon from the fuel, and the union gives off heat. Many other chemical actions give heat. When a bricklayer mixes lime and water as part of his mortar, the mixture becomes very warm. Chemical action within explosives releases tremendous heat as well as force.

Another means of getting heat is by friction. Primitive peoples in all ages have started fires by rubbing sticks together in one way or another. American colonists struck flint against steel to produce a spark by friction. Today, when we strike a match, friction generates enough heat to set the sensitive chemicals in the tip afire.

We can also produce heat with electricity. Passing enough current through a wire makes it red hot. Electric toasters, heaters, and irons work on this principle.

Atomic energy is another source of heat. The reactors ("piles") which produce material

for atomic bombs can generate power to drive trains and automobiles and heat enough to provide electricity for a city. The first reactors were not designed to generate heat and power for ordinary uses; but engineers are making progress in designing apparatus which will give satisfactory commercial service.

What Is Heat?

It may seem strange that these vastly different sources can all give the same thing, heat. But it is not hard to find something that is the same in all of them; and it is this "something" that gives us heat.

What can be the same in things as different as the sun, a rubbed stick, a hot wire, and the material in an atomic reactor? It is this: each object is made of matter. But all these sources of heat are made up of different kinds of matter, and each kind is in a vastly different state. Therefore, whatever gives us heat must be the one thing that is present in all matter. The one thing that is common to every kind of

matter is that it is made of molecules—particles so small that billions and billions of them can be found in the point of a pin. (For a picture, see Atoms.)

These molecules are always moving and hitting each other. In a piece of solid matter such as a stick of wood or a wire, the molecules stay in place and move by vibrating. In a liquid such as water they roll and tumble about each other, like grains of sand pouring down a chute. In a gas they fly about freely in space, like so many bullets shooting here and there. But in every case they are in motion; and it is this motion of the mole-



All matter is made up of tiny moving bits called molecules. At any ordinary temperature they are moving at terrific speed, and it is their motion that we feel as heat. Though we think of winter air as "cold," it has a great deal of heat—molecular motion—in it.



In summer the motion of air molecules is much more furious than it is in winter. They jostle and bump one another many more times a second than they do when air is cold. These collisions spread the molecules ont, making warm air thinner and lighter than cold air.

cules which is the source of heat. Scientists go even further in explaining heat. They say that heat is nothing more or less than energy given by motion—the average amount of motion in the molecules of a substance. (The energy is called kinetic, from a Greek term meaning "moving.")

Our own bodies can show what this means. They are made of molecules, and at any time the molecules have a certain average energy of motion. If this average is "just right," we feel "right"—neither too hot nor too cold. If the molecules go faster than usual,



we feel hot If they go slower we feel cold Sort is with everything in the universe from the blazing sun to the ict at the North Pole Heat depen is upon the average energy of motion in the molecules of any substance we consider

Temperature and the Amount of Heat

When we use a thermometer we measure the temperceivre of a substance. This means that we are measuring the average energy of motion in the molecules of the substance. This energy depends up n two thinge the mass of the molecules and their aver

age epeed. Mesa remains the same no matter what the heat so changes in temperature must be naused by changes in average speed The average is what counts because each individual molecule changes its speed con stantly as it bumps into oth ers and bounces away

This shows that temperature is not the same as the quantity of heat in a substance Quantity depends upon the number of molecules and their mass as well as their speed It takes more energy to get heavy molecules going faster than it does lighter ones -or to get more molecules going faster A burning match and a log fire may have the same tempera ture but the log fire has a much greater quan

t ty of beat The Meaning of Cold

From the nature of heat it is easy to see what is meant by cold be completely cold a substance must have its mol erules completely at rest Scientists say that in outer space between the stars the sun and its plan ets matter is in about this condition. The temperature there is hundreds of degrees below zero. Any thing that has higher temperature- and this means every fam har thou-has some mot on in its molecules and has some heat

What we usually mean by hot or cold is this The substance we are considering has a higher or lower temperature than our bodies have On a sum mer day we get used to the temperature of the air In comparison we water seems cold But if our hands are chilled on a winter HINGS EXPAND

#### day ice water may feel warm How Substances Get Hot or Cold

Heat travels from botter objects to colder ones A pan ful of cold water on a fire soon warms up If you go near a fire after being chilled in win ter you soon feel warmer

The nature of heat as energy of motion explains these The faster moving changes molecules in the hotter object strike those in the colder one and speed them up As this hapnens the colder object gains heat that is greater energy of motion in its molecules. When the energy is the same in each substance the transfer stons

One substance can cool another by the same proc

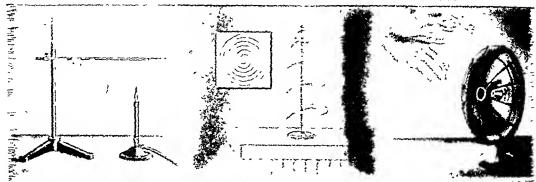
ess The transfer of heat runs the same way-from the warmer object to the cooler one But the warm er one has given up some of its energy of motion in other words it has been cooled

Heat Expands Matter The nature of heat also explains why substances





### HOW HEAT TRAVELS FROM PLACE TO PLACE



Heat moves in three ways. Stick bits of wax to a metal rod and heat it at one end (left). Conduction will carry heat slory be rod, and the pieces of wax will drop off one by one. Cut a spiral from stiff paper and support it over a radiator (senter). Consecution will make it whirl. Radiation carries energy through empty space. An electric heater (right) is a common example.

expand when they are heated. For a simple example imagine a crowd of people packed closely together. Then imagine the people getting restless and elbowing each other. They will push apart, and the crowd takes up more space. It has expanded.

This is very much like what happens when a substance is heated. Its molecules get more energy of motion and as they collide they push each other farther apart. This makes the substance expand.

Gases expand the most when any given amount of heat is added. Liquids expand less, solids least of all. It is easy to prove that solids do expand as they gain heat. Lay a nail flat and adjust a pair of calipers to its ends. Then heat the nail and try the calipers again. They will not fit over the ends. The nail has lengthened because the metal expanded.

### Conduction of Heat

Heating a nail in a fire illustrates a common method of heat transfer called conduction. Conduction occurs whenever a hotter substance is in contact with a cooler one. The more energetic molecules of the hotter substance transfer energy to the others.

Heat also passes along or through an object by conduction when some one part is heated. But substances vary in the rate at which they conduct heat. This can be proved with a glass rod and an iron rod. Hold each by one end and place the other ends in a flame. The iron rod will become hot to the touch while the glass rod is still cool.

Substances that conduct heat easily are called conductors. Those that do so poorly are insulators. Metals are the best conductors because their molecules are closely packed, and motion is quickly transferred from one molecule to the next. Silver is the best conductor, copper is next, and aluminum is third. Liquids are poor conductors, and gases are poorest of all.

## Transfer of Heat by Convection

Heat can also be transmitted from one place to another by the movement of a heated gas or liquid. This kind of heat transfer is called connection.

Most systems for heating houses use convection. A radiator heats a whole room even though it is not touching any object in the room. Air heated by the

radiator flows to other parts of the room and there transfers part of its heat to cooler objects. Such a flow is called a convection current. Heat sets up convection currents in liquids also. These may be seen in a pan of water heating on a stove. The water rises over the hottest part of the pan, flows to the cooler edge, and goes down.

### Heating by Radiation

A third method of heat transfer is called radiotion. It carries heat across empty space, such as the space which lies between the sun and the earth. It will also transfer heat through air-filled space.

The article on Radiation explains how energy travels across space in a wave form. The transfer is the same as that which carries light, except that the frequency (number of vibrations a second) is less. Since this frequency is only slightly smaller than the frequency which carries red light, this type of heat transfer is often called infrared (meaning "below the red") radiation. Another name is infrared rays.

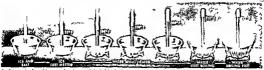
Every hot object, from the sun to a flatiron, generates infrared radiation according to its amount of heat. The radiation moves at the speed of light (186,00) miles a second). This swift action explains whr as electric heater gives heat so quickly. It sends infrared radiation into a space instantly. It does not have to heat the air by conduction or convection.

When the radiation strikes a dark object it is absorbed, and the energy makes the molecules more faster. Light-colored objects tend to reflect infrared radiation rather than absorb it. This is why white clothes are cooler in summer than dark ones. Shing surfaces also reflect infrared radiation. That is why polished metal is used behind the heating element (hot wire) of an electric heater.

### How Heat Is Measured

For many hundreds of years, civilized men had no way of measuring temperature accurately. Modern thermometers were not developed until the 17th century. Thermometers are marked according to either of two standard scales, the Fahrenheit and the certigrade, or Celsius. The differences between the two are explained in the article on Thermometer.

### HOW WATER BEHAVES AT DIFFERENT TEMPERATURES



A mixture of sait and its can absorb a great deal of heal. A the momenter are in such a mature will read of Fah enhet. In plan me ingice at will read only 32. As was a is bested in issue carry as so be 212. Thus a bo a—that a ji turns into a gas which we call itsen Further best as whe temperature. The ways a map it of a jater.

Scentists also use a reals deviced by Lord Kelvin. He and other physic sto computed the temperature a substance would have if its molecules had no met on This temperature is called obvolue zero Today it computed as 450 0% below 200 Fal sembet 1—273 16° cent grade). The Activa scale uses centigrade digress struing from absolute zero.

The quantity of heat in a substance a conjuted from the temperature changes that occur when it is heated Sc entists commonly use a unit of heat alled the calorie or gram calorie. This is the amount of heat necessary to ruise one gram of water one degree centigrade. (The calor is used by debtains) low

ever is the kilogram calorse 1000 times as large) In physics the of

times as large). In phys es the of ficial unit is the posite (239 cxl ones). Engineers however use the Bruish thermal unit (B T U) the heat required to rause one pound of water one degree Fahrenheit A wooden kitchen match burned com pletely releaves almost exactly one B T U. The heat-grung value of

fuels is stated in BTU s Specific Heat

All materials cannot soak up heat at the same rate One BTU will warm one pound of water one degree Fahrenheit But it will warm a nound of lead 30 decrees

The heat in a substance depends party on its mass—the number of molecules in it and their weight. It also depends upon the kind of without the substance of the substance of a substance. It is equal to the unineer of substance is equal to the unineer of substance. It is equal to the green of a substance of a substance of a substance of a substance of the substan

Substances also change their state when they are heated or chilled When water is cooled to 32°F it freezes to a solid (see) If heated to 212°F it becomes a gis (steam) All simple substances change their state at certain temperatures

Both the freezing point and the inclinic point of water see 32°F. It might seem impossible that a substance can take either solid or liquid form at this point but this as so. Suppose a pound of see is heated from OFF to 32°F. When it reaches this temperature nothing happens. The ser remains firm and solid even though 32°F is the melting point.

The reason is simple. The molecules in a piece of see are nightly bound together in a crystal pattern

bound together in a crystal pattern After the temperature reaches 32° a great deal more heat (144 BTU s) must be added to break

B T U s) must be added to break down the ice crystal into water When water freezes exactly the reverve happens. The water react cs a temperature of 32°—then it gives off 144 B T U e more a pound before the molecules slow down and rous into ice crystals.

The extra quant ty of heat required to make water or eny other substance change its state between solid and I qu'd is called the heat of f stom Different substances have different heats of fusion. When a substance bols there is a smilar s tuation After water reaches 212°F it must get a great deal more heat before it changes to steam For a pound of water this amounts to 970 B T U s This ad ditional heat is called the heat of papers atton of a substance To change a substance from a gas back to a liquid the same amount of

heat must be taken away

Variations in Bolling

A liquid reaches its stan lard boil
ing point under simple cond tons—
with pure liquid in open vessels
and at sea level atmospheric pressure

The boiling temperature be-



Tamperatore is and the same an the comment of heat is a substance. Heat og a pit said a gallon of water over a m at free shows that. Each want ty gats the same amount of heat but the tamperature goes up feater a the could of anneals.



ing so at—the tempe sture of which a not got Pan water rubh neceded and sait mater built at the two juras shown bets. But extra heat the added after the temporature of control before he ling starte.

comes high if a solid such as salt is dissolved in the liquid. Gas dissolved in it lowers the boiling point. The boiling point also changes when surrounding air pressure is altered. High pressure as in a steam cooker, raises the boiling point considerably. Under low atmospheric pressure, as on a mountaintop, a liquid boils at relatively low temperature.

This happens because boiling depends on the balance between the forces within the liquid and those in the space above it. At any temperature, some molecules tend to escape from a liquid into the air. Even at low temperature, they exert a measurable pressure. When the liquid is heated, their ability to escape increases and the pressure rises. When this pressure is greater than the pressure of the atmosphere, the liquid boils. Obviously, then, the higher the atmospheric pressure, the higher the boiling point, and the lower the pressure, the lower the boiling point.

When water is heated in a closed vessel, the pressure above the water is greatly increased, and so the boiling point is raised. Water raised to high temperature under pressure but not yet boiling is said to be superheated. When water does boil under such conditions, the steam given off is superheated also. Superheated steam is used in most steam engines because it is "dry"; that is, it does not tend to condense on the cylinder walls.

The converse of superheating is supercooling. When a liquid is cooled at reduced pressure, it will not freeze at its ordinary freezing point but will remain liquid. The same thing will happen to water at ordinary pressures if it is cooled very slowly and carefully. Its temperature can be reduced far below 32°F., and it will not form ice. But once it is supercooled, a sharp rap on the vessel or a tiny crystal of ice dropped into it will cause it to freeze instantly.

### Early Theories about Heat

The wonders of heat have always fascinated men. Primitive people have usually thought that heat was a gift from the gods. In the 17th century, scientists developed a curious theory about heat. They thought that when something burned, a hot invisible substance they called *phlogiston* escaped from it. But toward the end of the 18th century, the French chemist Antoine Lavoisier proved that this could not be so. He showed that metals weighed *more* after being burned than they weighed before. This happened, he proved, because when it burned, the metal combined with oxygen from the air.

But Lavoisier did not explain the nature of heat itself. Scientists generally thought of it as a weightless invisible fluid which flowed from one object to another. They called the fluid caloric. This theory was discarded when Count Rumford, a brilliant physicist, proved that heat resulted from motion. He knew that the brass blank for a heavy gun barrel grew very hot when it was bored. He repeated this operation many times under conditions which seemed to prevent any flow of "caloric" into the blank. Each time, heat was generated. Therefore the heat could come only from friction.

Sir Humphry Davy proposed that the energy of friction made the molecules of a substance move faster. In 1840, James Prescott Joule showed that a definite amount of work (energy) always produced a certain definite amount of heat. Since that time. Davy's theory of heat has been generally accepted. HEATHER. The songs and stories of Scotland are filled with praises of the "bonnie blooming heather." It covers the rugged Highlands with a cloak of purple and mingles its delicate fragrance with the upland air. The heather enters into the life of the people as perhaps no other plant has done in any land.

The heather—or "ling," as it is sometimes called—is found not only in Scotland, but also throughout northern and western Europe. It is a small evergrees shrub, sometimes rising only a few inches above the ground, but often growing to a height of three feet or more. On its purplish brown stems are dose-leaved

green shoots and feathery spikes of tiny bell-shaped flowers, usually rose-lilae in color, but ranging from deep purple to pure white. White heather, which is somewhat rare, is the most prized of all. In Scottish superstition this plant is thought to bring good luck.

Not only does the hardy heather lend beauty to the landscape, but it serves many useful purposes. The tops afford winter forage for Highland sheep and cattle. THE HEATHER OF SCOTLAND

The tiny, delicate bells of the common heather cast a purple mist over the Highlands in autumn.

The flower is a favorite of the bee, and heather hone; has a delicious flavor. The larger stems are made into brooms, the smaller into brushes. Owing to the scarcity of wood, the Highlanders in former times built cabins, or "shielings," of heather stems cemented with mud, and the same plant served to thatch the roots. Heather laid on the ground with the small twist uppermost formed a comfortable bed for the old warriors, as it still does for shepherds and hunters.

The common heather (Calluna rulgaris) belongs to the family of plants called heaths (Ericaccae), from the fact that they grow on open tracts of poor and uncultivated land. There are more than 400 species, the greater number being found in South Africa. Some of these species have flowers of large size and brilliant color. Other varieties grow in the Mediterranean region in Europe, and one of these (Ericaccoparia) is used in making the so-called "briarwood" pipes. Heather like that of Scotland has been found in the existence part of North America, but many scientists think it was introduced by early settlers. African species are sometimes cultivated as a garden or hothouse plant.

JUNE 2

### INDOOR COMFORT with Modern HEATING

SOON AND

through elaborate systems of blower or exhaust fans and ducts

How Rooms Are Heated

Heating systems vary greatly in detail, but most of them begin by burning fuel but most of them begin by burning fuel in a furnace located in a basement. Where mespensive current is available electricity may be used in place of a combestible fuel Heat is then cerried to the rooms by warm air, but water or steam These best-carrying mediums or fluids travel by pipes or ducts to best distributions in the rooms.

Once in the room, the heat warms by brandation connection or conduction to conduction or considerable that the same processes takes place at the same the waste for casing and object coding and its objects also gram and the same and the surfaces of the heat-distributing unit and the surfaces of the heat-distributing unit and the surfaces make heat to come and the surfaces make heat to come and the surfaces make heat to cover the same than the surface of the heat-distributing unit and the surfaces make heat to cover the same objects of the same and the surfaces of the heat-distributing unit and the surfaces make heat to cover the same objects and the surface of the same and the surfaces of the same and the surfaces of the same as a same to cover the same objects of the same as the

Warm air systems are especially suitable for smaller houses. Cost of installs ton se usually lower than hot water

s heart fut soler house capt suo a hast on water days desves protect i from sum The potures at the right si the suo a rays outer the we

JEATING AND VENTILAT TWO A fireplace with sching long bid and on the arth is an inviting scene in inter But it is a very poor along deeree Stoves are more ficent but a stove only heats he room (see Stoves and implaces). It is far better herever wanters are severe tough to require steady armth to heat a building armth to heat a building

om a central heating plant
hus the heat is distributed throughout the spaces
than the building and warms each one evenly.
In large buildings especially auditoriums a heat-

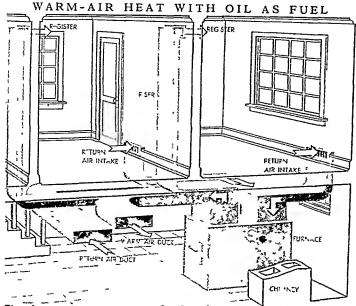
in the buildings especially accordance in the graphy be insked to a fresh are supply. This rings comfort from circulating arm add to a torsitabling the heat Ar circulation systems also ork well in the summer and may be part of a complete a reconductioning system (see Air Conditioning). Ven altion may come simply through open madmas or



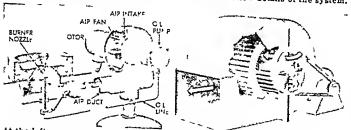
or steam. Hot-water systems have the advantage of delivering a controlled amount of heat. Steam heat is best in larger buildings, where greater quantities of heat are needed! Steam can circulate freely through a tall building and usually requires smaller pipes and distributing units than hot water.

Furnaces and Bollers

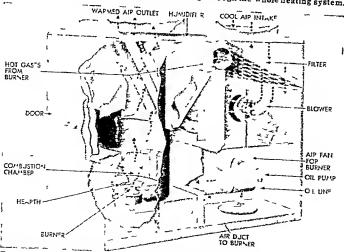
The warm air furnace consists of two basic parts a combistion chamber or fire put in which the fuel



This picture shows one method of arranging warm-air ducts in first-floor rooms and hasement In the rooms, supply ducts end in registers high on the walls. The return registers and ducts are low. The pictures helow show details of the system.



At the left is a gun type oil hurner. The paddle-hladed fan supplies air for burning through the large duct and compressed air to atomize the oil through the small inner duct. A hlower fan (right) keeps air moving through the whole heating system.



The hlower (right) draws in cool air for re-warming and hlows it through the furnace and up the supply duct. Hot gases from the hurner heat the air as it passes through The filter removes dust and the humidifier adds moisture to the dry air

is burned, and a surrounding air jacket where the air is heated. To control the amount of air reaching the fire, the furnace has a draft door and a check damper in the smoke pipe.

A furnace for hot-water heating has a water chamber or jacket surrounding the fire pot. This arrangement is called a boiler. The hot water flows through pipes to the distributors in the rooms, gives up its heat, then returns to the water chamber for further heating. A steam-heating plant resembles a hot-water system, except that water in the chamber is heated to the boiling point and vaporized. Steam rising from the boiling water travels by pipes to the heat distributors, gives up its heat, and forms water (condensate). The condensate then flows back to the water chamber.

### Generating the Heat

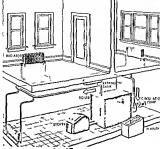
The furnace fire may be fed by coal, coke, oil, or gas, or the heat may be produced by electricity. Each of thee may be used in warm air, hot water, or steam systems; the choice depends usually on availability or cost Anthracite is preferred for coal-burning furnaces, because it is long burning and almost smokeless. Sometimes a semibituminous coal called Pocahontas is used because of its lower cost Coke burns with a clean flame, without soot or smoke, and is easy to handle in hand firing a furnace Oil and gas are popular because they are fed automatically and burn completely They leave no ash or residue other than a small carbon deposit.

To eliminate the labor of shoveling coal into the furnace, many buildings have stokers which automatically feed coal into the fire box. Coal is fed from the hopper to the fire box by a screw or ram. A fan blows air needed for burning into the fire box through a ring of nozzles called tuyeres To fill the hopper itself, a second screw may transport coal from the bin to the stoker. Some stokers also remove

ashes automatically.

Before oil can be burned efficiently it must be atomized—that is, broken up into tiny particles. This may be done by a steam or air jet, or by a centrifugal device that spins the oil off the edge of a disk or cup. The gan type of oil burner provides a pump to feed the oil and a blower for atomizing and to supply air for burning

HOT-WATER HEAT WITH COAL AS FUEL



Gas furnaces may rece se a continu ous supply from city gas mains or from portable tanks which store the gas under compression Most gas burners are of the Bunsen type and burn gas with a nonluminous or blue flame (see Bunsen Burner) Ar is mixed with the gas before it reaches the burning point and more air 18 introduced by draft around the flame to aid the

Carrying Hear to the Rooms Oace the heatcarrying fluid air, water or steam—is properly warmed in the fur nace or boiler it.

burning process

must be carried in the same of the same of

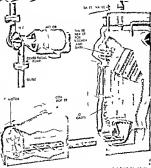
duce a new supply of outside air or cold water into the system Hot-air systems have sheet-metal

notoni systems have sheet-metal fucts running to room outlets called regaders. One duct carries warm air note her noom another duct returns cooled as to the furnace for re-heating Sunje systems work by letting airm air rise naturally in the duct. As the warm air enters the room the cooled air drops through its regader and duct. A more efficient method provides a motor-driven fain. It's keep is constant flow of air in the system. With a fain the ducts can be much smaller.

A narmour system can be equipped with a simple humidifier to add need ed mosture to the hot dry air. This consists of a flat pan located in the luriace air jacket and a water-feed arrangement that keeps the pan filled In a forced air system an air filter can be located in the cold-air return duct to thap the dust in the air. Pines for carry.

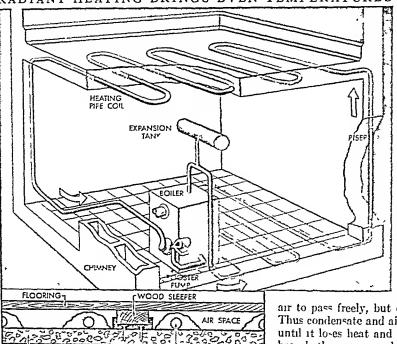
> the boller and cool er water back may be arranged in a single-mon monoflow system or in a twopipe system In tha frat each radia tor 15 attached to the line by two short pipes hot water enters from the upstream" side and the cooler n eter discharges in to the downstream side Thus cooler water from the first radiator mixes with hot water on its way to the second radiator and so on through the house Successive radia tors along the line must have larger surface areas beeause each one rereives cooler water than the one be-

ing hot water from



The lop p clure shows a mossiliew p pe system for het walet hest ag as caple not in lies article. Below it are the stoket and be let with the booster pump abown in the sacel st left. The sudder de vex coul min the transce where pump abown in the sacel st left. The sudder de vex coul min that transce where it here is not not combant a ded ky a 'I am the taylers. List games it here is not be something on and also water for the k takes and hall. The ca

construction is a law with the construction of the twoconstructions give a law water circuits to ppe system the unit takes hot water from the feed line and discharges cooler water into the return line Usually the lines run purallel through the house RADIANT HEATING BRINGS EVEN TEMPERATURES



POUPED CONCRETE HEATING PIPE COILS One method for installing radiant-heating pipe coils is shown here. The pipes are embedded in the floors, with risers and returns in the walls The holler, hooster pump, and expansion tank work in the same way as conventional hot-water systems. The cut-away picture shows the details of installing pipe coils.

Power for eirculation may come from gravitational force alone or be aided by a booster pump. Hot water is less dense than the cooler water, and so rises naturally, aided by convection eurrents, while the cooler and denser water falls. The water actually expands when heated, so there must be an expansion tank in the system to hold the greater volume of hot water temporarily.

In the so-called "open" system, the evpansion tank is located above the highest distributing unit and is open at the top. The whole system operates under normal atmospheric pressure, with the maximum temperature of the water limited to about 200° F. For greater heat in the radiators, a closed system is installed. The expansion tank is sealed and is generally located near the boiler. When the water is heated, it expands against air in the tank. The air becomes compressed and exerts greater than atmospheric pressure against the water. This added

pressure permits the water to reach temperatures higher than 212° without boiling. Pipes for steam heat are similar to those for hotwater heat. A one-pipe system carries steam to the heating unit and returns the condensate along the

out through a valve in the heating unit by pressure of the incoming steam; or it may be exhausted from the whole system by a vacuum pump. With a partial vacuum in the system, steam can be formed at temperatures as low as 160° F. In an ordinary steam system without a vacuum pump the steam must enter the heating unit under pressure

to force the air out through a small escape valve. For removing air and condensate, the tapor system provide a

trap in the pipe leading to the

same line. A two-pipe system

carries steam in one line and condensate in the other. Arr in the system may be driven

return line. This trap has a gate that allows water and air to pass freely, but closes when steam reaches it Thus condensate and air flow out, but steam remains until it lo-es heat and liquefies. Some steam plants

have both vacuum and vapor systems. Some cities have large steam- or hot-water heating plants that supply heat for many buildings within a eertain zone. This method is called central or dutrict heating. Customers are charged for steam heat by the amount of condensate returning to the boiler Heat-Distributing Units

The simplest heat-distributing unit, the regists. is used with hot-air systems. Gravity hot-air systems have both supply and return registers 00

HOW HEAT WAVES RADIATE CCVICKÈTE LHEATING FEES

The orange arrows show how radiant heat waves rise from the floor, pass to the walls, ceiling, and the objects in the room. They reflect hack and forth until everything is equally warm. There are no spots of concentrated heat to set the air moving in drafts.

FARTH

systems may have the supply register high on the wall and the return register lower down, or both registers may be high The registers usual ly have dampers for regulating the air flow. For hot-water or steam systems, the eommonest heating unit is the radiator.

the floor or on the

lower part of the

wall. Forced-draft

This unit is somewhat misnamed because it gives off heat mainly by convection, although both radiation and conduction take place as well. The ordinary radiator is made up of hollow sections of cast iron, wrought iron, or steel, spaced to allow the full surface of each sect on to be exposed Hot water or steam flow ng through each section warms the radiator sur faces and these in turn give off heat to the sur rounding air Rid ators usually have a valve for controlling the steam or hot-water supply Steam radiators are generally smaller than those for hot water because surfaces heated by steam

Anotl or device for d 8tributing hot-water or steam heat is a contec tor. This consists of one or more copper tubes that pass through a long file of closely spaced metal sleets or fins The fine are fitted or soldered to the tubes and the whole arrangement is placed near the

give off greater heat

bottom of a rectangular shaft open at top and bottom The ehaft may be the sect on of the wall under a recessed window or a metal cabi net in the room Steam or hot water passes through the tubes and these in turn transfer heat to the fins The shaft acts as a chimney drawing cold air from the floor level and through the heated fins The air non warmed passes through the gr lle at the top of the shaft

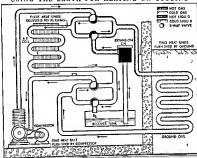
and into the room Panel or Redient Heating

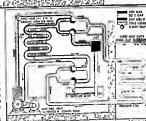
Radiators and convectors have several d > advantages. They take up needed space in the room are often out of harmony with the room furnishings and do not heat uniformly. To Overcome these difficult es many bu ldings are being equipped with panel or radiant heat ng

Actually radiant heat ng is any method that supples leat by radiation but the term is widely used to describe heating units that are concealed in walls floors or ce lings These actually supply heat mainly by radiation there is also some convection and conduction action S nce the installations are concealed many engineers

prefer to use the term panel leaters Warm air can be used for radiant heating in a floor or ceiling support constructed of rows of hollow tile A warm-air duct carries heat into one end of each row the air passes through giving up its heat to the floor The cooler air then passes to a return duct at the other end of the row Hot-water pipes can be embed led in the floor or in the plaster cell ing They can also be embedded in pluster walls These pipes may be arranged in a continuous coil or

325 USING THE EARTH FOR HEATING OR COOLING WITH NOT GAS





net cloras can be used for w at ng lower p clure) valves are the build ng in water and to dit que

m a grid pattern Still other radiant heat units may be tempered glass panels with an electric res stance coil fused to the back. The whole arrangement is embedded in the wall

Radiant heat warms the walls ceiling floor and objects in the room to a comfortable temperature while the air remains at a lower temperature Since every surface in the room is warm an occupant does not lose his own body heat to them by radiation The air remains at about the same temperature and there are no updrafts and downdrafts caused by heat The pleasing effect of radiant heat is the same as that experienced outdoors on a winter's day when the air is still and the sun is hright.

### Controlling the Heating System

Modern systems deliver heat in response to the wishes of the occupants of the huilding and to changes in outside temperature. The device that controls the heat delivery is called a thermostat. The heart of the thermostat is a primary or sensitive element. This has physical properties affected by temperature changes. The element may be a strip of two metals, usually steel and brass, brazed together; a hulh of mercury; or a material similar to hard rubber. Changes in the primary element work through an electric current or compressed air to move a valve, damper, switch, or pump (secondary elements). These actually control the heat flow.

In a simple bimetal strip thermostat, temperature changes cause one metal to expand or contract faster than the other. This causes the strip to curl and close an electric contact. The current then starts a motor which may regulate an air damper, a stoker, a gas- or oil-supply line, or a pump or valve in the distribution system. Eventually the flow of heat is regulated to restore the room to the desired temperature.

The sensitive element in a compressed-air thermostat is a tuhe made of ebonite, a kind of hard rubber. Expansion or contraction of the tube changes the rate of air leakage through a nozzle. This changes the air pressure on a flevible bellows or diaphragm, which in turn controls the secondary element.

The mercury thermostat works by direct expansion

of the mercury through a capillary tuhe. This produces a pressure which in turn governs the action of a regulating device. Radiators may also be individually controlled by self-enclosed thermostats that act directly on the supply valve.

Sometimes there is a very considerable lag between changes in outdoor temperature and the rise or fall of heat in the room to compensate for those changes. In the meantime the room may grow uncomfortably hot or cold. To prevent this, heating engineers now

install outdoor thermostats to work with those in the huilding. These anticipate necessary changes and help keep the room at the desired temperature.

Heating by "Refrigeration"-the Heat Pump

A body of air, water, or earth, even when quite cool—say at a temperature of 55° F.—actually contains a great amount of heat. If this temperature were lowered by five degrees, the body would give up a quantity of heat, which could be captured for heating homes. The revolutionary heat pump, shown in diagrammatic form on the previous page, takes heat from air, water, or earth by cooling it.

The pump uses the same cooling action that takes place in the home refrigerator (see Refrigeration). Instead of the cooling process taking place in the box, it takes place in air, in ground water, or in the earth somewhere below the frost line. The action

can be reversed in summer for cooling.

This device is most practical in regions where the lowest temperatures are not extreme. With air as

the heat source, pumps are now being used in the Southwest. They also work where there is a large supply of ground water at a winter temperature of about 55°. Both air and water are discharged after cooling. Pumps in the earth must have longer collsince the earth renews its own heat slowly.

Capturing the Sun's Heat Indoors Even on a winter's day in the temperate zone, the sun radiates a good deal of heat to the earth—enough to warm a house during the middle hours of the day, if plenty of window surface is provided for the sun's rays to enter. To capture this solar heat, house are now being built with a broad, unbroken expanse of window along the south side. Eaves or projections above the solar window pre-

vent the summer sun from shining in. But the lower winter sun can deliver its heat directly. A conventional heating system, governed by thermostats, supplies heat during the night and parts of the day when solar heat is insufficient. An experimental house near Boston, Mass., uses tons of Glauber's salts to store solar heat during the day. When the sun goes down. the salts cool and give off their heat to the house. HEBE (he'be). In the Greek mythology this goddess Hebe typified eternal youth and joyousness. She was a comely maiden, with sparkling eyes and rounded form, ever smiling; and Milton in his famous poem 'L'Allegro' speaks of-

> Nods, and becks, and wreathed smiles, Such as hang on Hebe's cheek

She was the daughter of Zeus (Jupiter) and Hera (Juno) and served the gods as eupbearer, until one day she tripped and fell. Then the lovely youth Ganymede took her place, and Hebe became the wife of Heracles (Hercules) after he was deified. HEBREW LANGUAGE AND LITERATURE. To most persons of European descent the chief representative

of the Semitic tongues is Hebrew, the sacred language in which most of the Old Testament was written and in which its Scriptures are still read in the Jewish synagogues. The Semitic languages (a group of Asiatic and African tongues) are divided into two great branches, the northern and the southern. To the former belong Hebrew, Phoenician, Aramaic, and Assyrian, while Arabic and Ethiopic are of the second group. Hehrew and Phoenician are so closely related that they are considered as dialects of one tongue.

The Hebrew language is very ancient and was spoken in Palestine as early as 2,000 years before Christ. The words are short, for the most part, and the grammar and sentence construction are simple. Much is expressed in a few words, and, though often rude, the language has strength, grandeur, and a deep sonorous quality well suited to poetry and the expression of religious feeling. As in other Semitic tongues the parts of speech are derived from roots or word stems having three letters. Originally the Hebrew alphabet was made up entirely of consonants and the vowel sounds were omitted. Early in the Christian Erahonever, vowel signs were inserted underneath the consonants as is done today in some systems of shorthand (See vowel points in Alphaber table Pact-IADEX) The writing reads from right to left, as in Arabic, and from the back of the book to the front

Parts of the books of Damel, Ezra, and one verse in Jeremiah are written in Aramaie, the rest of the Old Testament is written in Hebrew This and a few inscriptions are all that remain to us of ancient Hebrew literature In daily speech the Jews gradually adopted the Aramaic language of their Synan neighbors, but they preserved Hebrew as a religious and interary language. In the first four or say centuries of the Christian Era there grew up a great body of writings known as the Talmud (meaning "teaching" or "learning"), consisting of two parts. The first of these, the Mishna, or orallaw was written in Hebrew. the second, the Gemara, or commentary on the law, in Arsmaic The Mishna is a systematic collection of religious legal decisions developing the laws of the Old Testament The Gemara is a great unordered mass containing arguments and opinions on the law and much miscellaneous material. It has been called a 'hterary wilderness" Discussione and hair sphtting arguments are interrupted by charming tales and (arables In its pages are poems, prayers, anecdotes, and maxims, together with science and mathematics The Telmud formed a bond between the scattered Jews and kept alive their learning during the Dark Ages It helped them play a large part in the restoration of learning during the Renaissance

In the Middle Ages a literature evolved which embodied the Cabala a mystical interpretation of the Scriptures based on the assumption that every letter

and number had a hidden meaning

Hebrew lends itself well to devotional poetry, and since the days of the Psalmists there have been out-'standing Hebrew poets in every age. Though the greatest were the 12th-century Spanish Jew, Judah Halevy, and, in modern times, Chaim Nachman Bialik

From early days the Jews have adopted the lanrage of the Country in which they happened to dwell rage of the Country and Josephus, the great death in the century at C. Josephus, the great death in the century at C. Josephus, the great death in the century at C. Josephus, the great death in the century at C. Josephus, the great death in the century at C. Josephus, the great probably because note for the most part in Great, probably because the most in the century for the death was written first in his native Aramas and then in Great, but only the Great version has come down to us. Moses ben Manuson (green'll) called Manusondes), the great Spanach Jewsal rablo, philosopher, and physician of the 12th century, wrote manuly in Arabic.

In Germany the Jess adopted German as their anguage, but they wrote it in Richrer characters. When persecution drove great numbers of them to the countries of eastern Europe, they earned this practice with them Mixed with some Hebrer and Silven words, and written in Richrev letters, this German was a standard of the second of the second

last century an extensive hterature has developed, and there are a number of newspapers and periodicals in Yiddish in the United States and other countries. The best of world literature has been translated into Yiddish.

Although Hebrew ceased to be a spoken language for centuries, as a literary language it never entirely died out. In recent times there has been a revival of interest in it as part of the revival of all Jewah traditions Fenodicals and books are appearing in Hebrew and it is now recognized as the official language of large!

HEBRIDES (heb'ri-des) ISLANDS Shortly before the Irish missionary, St Columba, died in 597 he looked out upon the tiny island of Iona in the Hebrides, or Western Isles, of Scotland and made a memorable prophecy "Unto this place, albeit so small and poor great homage shall be paid not only by kings and peoples of the Scots, but by the rulers of harbarous and distant nations, with their people also " And so it happened His work and that of his disciples made this island of only five square miles the most famous center of Celtic Christianity From it missionanes went to win converts in Scotland and northern England To it students flocked for centuries from all parts of the north Kings and chiefs were brought to it for burnal so that their dust might mingle with that of the "blessed sale "

From the end of the 6th century to the end of the 8th Iona's fame was scarcely second in unportance to any of the Brutis Isles. Then the vikings swept down from the north to conquer the island, and not until the 13th century did the Norwegian kings give way to the Scottsis kings.

Semieudal conditions continued until 1745 under the rule of attive chiefans Great depression followed the changes then introduced. Far the became excessively help, and large numbers of the tenantengrated to North America. In 1846 a pittle blight brought practically the entire population to the surgeof starvation. Thousands were removed to Australia Since them the system of Jant tenure has been revixed, and the hardships of the inhabitants have been greatly fessenge.

These islands off the west coast of Scotland are divided into two groups, the Outer and Inner Hebrides, by the ocean waterways of the Munch and Little Munch The most important of the Outer Hebrides are Lewis-with-Harris, North and South Uist, Benbecula, and Barra, of the Inner Hebrides, Skye, Rum, Coll, Tyree, Mull, Colonsay, Jura, Islay, and Iona Altogether, the Hebrides number over 500, only 95 are inhabited Of the total area of 2,812 square miles, only a small part is cultivated, the rest being moorland and mountain Sheep farming, cattle raising, fishing, distilling, slate quarrying, and the weaving of Scottish woolens are the main occupations of the people. While the country is poor, the scenery is wild and picturesque, and tourists add to the income of those almost treeless, storm-wracked islands Population of both groups (1951 census preliminary), 53 456

HECATE (hěk'a-tē). In Greek mythology Hecate is a minor goddess to whom Zeus gave powers in heaven, on earth, and in the sea. She could bestow wealth, victory in games and war, success in fishing and hunting, and other great gifts. The wide range of her powers probably accounts for her identification with other divinities such as Artemis, goddess of the chase and the moon, and Persephone, goddess of the infernal

regions. Her threefold character is thought by some to represent the phases

of the moon-waving, full, and waning. Because of her power in the lower world and the night, Hecate also became thought of as a deity of ghosts and sorcery. She was supposed to send demons from the lower regions into the world to teach black magic and witchcraft. She was blamed for terrifying dreams. As she traveled the world with souls of the dead she was visible only to dogs, who howled and whined at her approach.

Hecate was sometimes portrayed by artists as having three bodies, placed back to back. Thus she could gaze in three directions at once. Perhaps this was why she became the popular protectress of crossroads. Sometimes she is represented as having three heads-one of a horse, another of a dog, and the third of a lion. "Hecate's suppers" were deposited at crossroads in the scant light of the new moon. These offerings were made to court her favor, to appease her angers and appetites and those of the evil spirits that accompanied her, and to prevent the souls of the dead from appearing. The suppers generally were of eggs, fish, onions, and honey. Her devotees also sacrificed black puppies and black ewes to her-black because she was a goddess of the night.

Some scholars believe Hecate was brought into Greek mythology from Thrace. It is possible that "Hecate" is a short form of a Greek word that means "the one who comes from afar." Homer does not tell of Hecate, but Hesiod represents her as a daughter of Peres, a Titan. Later writers variously describe her as the daughter of Zeus and Demeter, of Zeus and Hera, or of Zeus and Leto. (See also Mythology.) HECTOR. Homer's epic poem, the 'Illiad', makes

Hector the tragic bero of the ten-year defense of Troy against Greek siege. Although aided by Apollo, the sun-god, Hector was slain by the Greek hero Achilles. Achilles wore armor made by Hephaestus, god of fire and forge, and was helped by Atbena. goddess of wisdom.

Although in English "hector" has come to mean braggart or bully, the Trojan Hector was both noble and brave. The son of Priam, the Trojan king, and Hecuba, Hector was the greatest of Trojan warriors. His wife was Andromache (ăn-drom'a-ki), and their infant son was Astyanax (as-fi'q-nax). He shared the

HECTOR REPROACHES HIS BROTHER



In this bas-relief Thorvaldsen, a Danish sculptor, shows Hector bitterly as-sailing Paris for idling with Helen while Troy is besieged by the Green

dangers of battle with his brothers, the bravest of whom was Deiphobus (dē-if'ō-būs).

How Hector Was Killed

When Hector left Troy's defensive lines to ask the elders and women of the city to pray to the gods for aid, Andromache begged him to leave the battle to others, lest she be left a widow and her child fatherless. Hector refused to be a coward, embraced his child, and returned to the battle.

With Apollo's aid he slew Patroclus, who wore the armor of the Greek's greatest warrior, Achilles. The Trojans rejoiced because they thought the dead man was Achilles. Achilles, however, was sulking in his tent because he believed he had been badly treated by the Greek commander. When news of Patroclus' death reached Achilles, he turned from sulking to anger. He vowed to destroy Hector. Achilles' appearance on the battlefield inspired the Greeks. They drove the Trojans inside the city walls-all except Hector. He awaited the Greek champion.

The sight of Achilles, clad in new armor made by Hephaestus. however, frightened him and he fled. Three times he circled the walls of Troy with Achilles at his heels. Then Athena whispered to Achilles that she would bring Hector to battle. Achilles halted. Athena took on the shape of Deiphobus and deceived Hector into the belief that the two would stand together against Achilles.

So Hector and Achilles met. Achilles' thrown spear missed Hector. Hector did not see Athena return it to Achilles. His own spear glanced off Achilles' godmade shield. Hector turned to take another spear from Deiphobus, but found no one at his side. Then he knew that a god had tricked him. Nevertheless, he valiantly drew his sword and rushed upon Achilles, who awaited him, spear in hand. One thrust of the spear killed Hector.

Achilles terrible vengeance was not satisfied a the Hector a death. He fastened the body to his charact and dragged it three times through the dust around the walls of Troy Andromache watching the hornble sight from the wall fell fainting into the arms of bee madens.

Achiles' vengeance did not cool. He refused Prans transom for the return of Hector's nody Aphronauto and Apolio preserved the body from decay until Achil it was the will of Zeus that the hody should be grodiest-mother. Thesis persuited in mit was the will of Zeus that the hody should be given up Hector's body as at then given to Prans upon payment of much gold and a large quantity of merchandes.

Duning an 11-day truce the Trojans mourned their hero and burned his body on a lofty pyre Tie, burned his sales under a high mound of stones Soon after the fighting resumed Troy fell to the Greeks (See also Achilles Mythology Trojan War.)

HEGUBA (Ack u-bo) In Greek legend Hecuba was the wife of Priam king of Troy Among the 19 chil dren she bore him were Hector Paris Cassandra Troilus and Deiphobus When the Greek chieftams cast lots for the captive women after the Trojan War Hecuba fell to Odysseus According to one account she afterward leaned into the Hellespont According to another she was stoned to death by the Greeks whom she I ad violently angered by her bitter abuves HEDGEHOG The hedgehog is found in many parts of Europe As its name indicates it dwells in hedges and thickets. It sleeps by day and at night it roots in the mold with its pointed shout for such food as meets enails and eggs When attacked it rolls itself into a ball thus exposing no part of its body that is not defended by it's sharp prickly spines It passes the winter in partial or complete hibernation The common hedgehog of Europe (Ermaceus europaeus) is about the size of a large rat Other sore es evist which are even smaller. No true hedgehogs live in America but the name is sometimes applied to the porcupine of the United States and Canada which resembles the true hedgehog in having a coat of stiff sharp spines



The hedgehog gets its name because it dwells in peop thickets it feeds at night on innects snails, and eggs frightened it rolls itself into a tight hitle ball

HEDGES Fences of living green describe two of the principal purposes of bedges barricade and ornament A third but less important purpose is cover for birds and small sumals. In Europe bedges are much used as fencing for isrmers fields in America they are more often used as ornament.

No plant meets the requirements of all farmers for an absolutely impassable barrier. From the middle 1800 a the Osage orange (Maclura gurantiaca) was widely planted by American farmers Since 1940 the multiflora rose (Rosa multiflora) an Asiatic shrub has been mereasingly used in the Midwest and the Northeast Th s grows a tangled mass of thorny stems sex to eight feet high bears a fluff of white to pinkish blos-oms and serves as a stockproof ferce and as cover for birds and small snimals. It also is effective m checking water and wind erosion. Unlike other thorny hedges it does not have to be pruned The honey locust (Gleditsa triacanthos) with spiny trunk and branches and with Isrge flat ornamental pods -whose sweet pulp gives the tree its name-is also used for farm hedges The hawthorn of Europe (Crataeque oryacantha) is subject to many fungus growths and as consequently not planted to any extent in America

The California privet (Liquidrum osalifolium) is popular where the winters are mild it holds its leaves nearly all winter and grows closer after each pruning

Where evergeess are used for hedges the Normay spruce (Foxe cardes) as a great favorte. Next per haps can, the Amer can arborvitae (Thuya conder table) other called northern white cediar with its short horizonfal branches assending at the end and short horizonfal branches assending at the end and short horizonfal that have praining well. The horizonfal of the short had been praining well. The horizonfal (B zeus semperatures) is much used in the old formal gardens of Europe.

gardens of Europe Many deschools result in the sale can be used for consential helging. Floriening shrubs are superany effectives the sale superany states of the sale superany states of Sprease (triad is result). The Augment rose (Hoos respon) which bears its sangle flowers all through the summer the common lists (Spreage subgrant) and the great pauseled bydranges (Hydrongea panuculas). Several species of borberty (Horberts) are beautiful and hardy especially the charming Berberts Municipal that's and the abundant seniel terries when remain fresh used the following spring Many species of borberts (Harden) are become my state of the sale of the sa

"HUBLIERG (h. dd./derg) Creatury. The old unresty town of Headeberg is one of the most pic world town of Headeberg is one of the most pic woolds height and the Seckar River. Here the river laves the gorge and enters the plans of the Ribne The old city cons six prancipally of a long narrow street following the course of the river for about two miles. It grew up at the foot of the castle begun in the

12th century, which crowns the wooded height in the background. Added to at different periods the castle became one of the largest and grandest in Germany. It was largely destroyed during the devastating wars of Louis XIV of France, and though later rebuilt it was struck by lightning and again ruined in 1764. Its ivy-clad ruins are still beautiful, and in an old cellar beneath is the great "Heidelberg tun," an enormous wine cask that can hold 49,000 gallons. Heidelberg University, one of Europe's most famous schools, is the oldest German university, founded in 1385. Once the capital of the Palatinate, Heidelberg passed to the former grand duchy of Baden in 1803. In the second World War, it escaped air raids. American troops captured it without damage in 1945, but the retreating Germans blew up the hridges. Population (1950 census), 116,488.

Heine (hī'nē), Heinrich (1797-1856). "I am a Jew—a Christian. I am tragedy—I am comedy." This is what the most gifted poet in 19th-century Germany said about himself. Heine was a man of puzzling contradictions and inconsistencies. He was a true poet and a splendid journalist, a historian without method, a philosopher without a real philosophy, a hater of despotism and an ardent admirer of Napoleon, a cynic who laughed at sentiment, but was himself a sentimentalist. He was born of Jewish parents in Düsseldorf, in western Germany, but later joined the Lutheran church in order to practice law, which he had studied at the universities of Bonn and Gottingen; but he never practiced law.

Heine's heart was in literature. During a visit to a wealthy uncle, his lifelong benefactor, he fell in love with a beautiful cousin. His spurned love found expression in exquisite poems which created a sensation in Germany. His liberal views and his intense admiration for Napoleon made it difficult for him to remain in Germany. He moved to Paris, where

he felt at home.

Although Heine wrote much ahout philosophy, literature, and politics, his fame rests on his poems. Many of these have achieved the popularity of folk songs. They are simple and full of warmth, and they have the freshness and melody of the skylark's note. Some of them, such as 'The Lorelei' and the 'Two Grenadiers', are universally famous. His songs have been set to music by many famous composers. A capricious quality pervades all his writings, even his most tender poems. He shifts from intense passion to careless mockery. One of his poems, 'My Child, We Once Were Children', pictures two children playing house in the courtyard and entertaining company, among them the neighhor's cat; and the sweet, pensive mood of the poem is broken by the satiric stanza:

Politely we asked how her health was. In the course of a friendly chat. (We've said the same things since then To many a grave old cat.)

It is in his prose writings that Heine's most sardonic flashes of wit appear. The 'Travel Pictures', which is hy far the most popular of all Heine's

prose writings, strikes a new and fresh tone and is full of sparkling wit. The prologue rings out mockingly at the "laundered bosoms," "polished salons" and "oily speeches."

A disease contracted in his university days at length developed into an ailment which resulted in paralysis. This strange man of contradictions, who had been impatient and irritable in health, showed remarkable endurance and cheerfulness in the long years spent on what he termed his "mattress grave." He died and lies buried in Paris.

Heine is perhaps best known to American readers by his poem 'The Lorelei', familiar to us as a German song. The poem suggests that dreamy time just before the approach of twilight. The sunset in a burst of glory lights up the mountain peaks. A boatman is returning home on the Rhine; he looks up and beholds a glorious sight:

On yonder height there sits
A maiden wondrous fair,
Her golden jewels sparkle;
She combs her golden hair;
With comb of gold she combs it
And sings, so plaintively,
A strain of wondrous beauty,
A potent melody.

Drawn by the enchanting power of her song, the boatman gazes upward at the beautiful maiden and fails to see the dangerous rocks below. Suddenly there is a crash, and boat and boatman are lost in the waves. In this story Heine makes use of an old legend which had grown up about a high and dangerous rock on the bank of the Rhine, called the Lorelei or "ellrock." It is at a narrow part of the river, about 23 miles south of Coblenz, near St. Goar. The rock has a remarkable echo, and it is from this probably that the legend of the enchanting song arose.

HELENA, MONT. In 1864 a gold strike made by four prospectors nearly ready to quit led to the settlement of Helena, Montana's capital. The gully in which they found gold they called "Last Chance Gulch." Today Main Street runs along the bottom of this gulch, and parallel to it are strung an interesting mixture of mining camp structures and modern buildings.

Helena lies in west central Montana at an altitude of 4,124 feet, some 48 miles north-northeast of Butte and about 12 miles west of the course of the Missouri River. Mount Ascension and Mount Helena he immediately to the south, the Big Belt Mountains to the east, and spurs of the Rockies to the west. The site is broken by numerous gulches.

The capitol was huilt in 1899, on a high, level site; two wings were added in 1911. Atop its copper dome rises a small reproduction of the Statue of Liherty. The Roman Catholic Carroll College, for men, is here, and the city has both Roman Catholic and Francesco, and the city has both Roman Catholic and Francesco, and the city has both Roman Catholic and Francesco, and the city has both Roman Catholic and Francesco, and the city has both Roman Catholic and Francesco, and the city has both Roman Catholic and the city has been contained and the city h

and Episcopal cathedrals.

The city is a trade and distributing center for surrounding mines, ranches, and farms. Its industries are small, and most of the city's workers are employed in state, federal, and county service.

Members of the Lewis and Clark Expedition visite the site in 1805 (see Lewis and Clark Expedition). In 1875 Helens was made capital of Montana Tern tory and it remnaed the equital when Montana became a state in 1859. The first rul hier reached the city in 1853. In 1855 a series of exchiqualates the city in 1853. In 1855 a series of exchiqualates and form of government. (See also Montana). Population (1939 census) 17 581.

HELGOLAND As an aftermath of the second World War the saland fortrees of Helgoland was reduced to crutching runs. The tm, transquiar-shaped saland by 28 miles northwest of the manihard of Germany guarding the contannes to the Elles and Wester rates and the nester need of the Rule (Land). Heavy Germany Contains the Contains of the contains the Contains of the Contains the Contains of the Contains the Conta

steel and concuete emphrenements. Heigoland is the furthest seaward of the Frisan Islands. It as brudered by re! sandstone-clifs which means palese drop 200 feet to the sea. Constant pounding by the sea is gradually wearing the rot. away Surrounding reefs and rock ledges slow that the original size was five times as great as its present 150 series Germany obtained the salind from England in 1890 in evaluage for concessons in East Afreas. It has never had any value other than as a

fort fication s te

where customs we will be the poet Thomas Moore called the damty helactrope in the flower enamoutred of the sum. The flower got its name from the Greek words addition (sum) and trope (turning) because atso one-ded spikes of leggrant flowers were about 3 supposed to turn toward the sum. In the 18th century a French both on the sum of the seed from Peru to the twynt garden at Pars There eccording to a warter of the me women welcomed it with eathersams according it their most precious vises animing it the flower of love and receiving with middlernet all bouquets in

which their favorite found no place
Many wild species of these barry many branched
skrubs are found in the worm and temperate regions
of the world. Cultivated varattes give as added
charm to greenhouses and gardens. They grow from
one to two feet high with flowers sarying in odor
from purple to violet and even white Because of their
vanilla like odor the flowers are used in making per

fume and sachet powder

The helatrope is grow (Medicropum) of the helatrope is grow (Medicropum) across the same temperature of the same temperature and warner parts of both becomplese of the Poerroon helatrope (Medicropum) permanents is the most common The knee-shaped serves are alternate and petiolet the tuny flowers from mon-saded curved spakes the cally as five-parted the corplica selver-shaped super-shaped parted the corplica selver-shaped parted the corplications of the corporation of the corplication of the corporation of the corporati

HELIUM This unique gaseous element was discovered in the sun before it was known on earth. In 1868

Pierre Jules César Janssen identified a new element in the spectrum of the sun J Norman Lockyer named it helium (from the Greek word helios sun ) Then in 1895 the same element was found in an ore of uranium

Helium is the lightest of the mert gases (see Periodic Table). Its lifting power is 92 per cent of that of the explosive gas hydrogen. The mertness end lifting power make it the best gas for use in blimps neither halloons and stratosphere balloons.

Helium is used in mechanic in place of a trope of the copyed The muture wave of vers and conson workers from the bends because helium does not decoder a the blood as reachly as introver (Carson). Authors pat ents are often placed in entroophere of beham and overgen to make the breathing caser. Helium is used in ora welding into sheld metal from air and keep if from bursing into fisme. In this way inflammable metals like magnesium on the seed of the consonies of the seed of the consonies of the seed of the consonies of the conso

Helium gas turns to a liquid at -452° F. This is the lowest liquefying temperature of any gas. With Liboratory methods involving liquid helium physicists have created temperatures within a timy fraction.

of a degree of absolute zero (see Heat)

The United States has virtually a monopoly on helms production. It is extracted from natural gas occurring in several states. Helms is separated from other gases how cooling the nature to about ~ 500° F. The other gases howely and gaseous helms may drawn off an element of the second helms of the second of the

Helium plants are owned by the federal government One big plant at Evell Tev supplies all peacetime needs Other plants at Amarillo Tev Otis Kan and 5h prock N M are held in standby state Helium was first produced in large quantities in 1917 intended for use in dirigibles. Its price then would have been more than \$2,000 a cub c foot Now it sells for about 12 cents a cubic foot (For diagram of the belium atom see Atoms Ions and Ionization ) HEMINGWAY ERNEST (born 1898) Out of the hor ror of war and the d sillusion of postwar life Ernest Hemirgany dren powerful novels and short stories He also found rich material for fiet on in the world of sports-boung buil fighting hunting and fishing But he went beyond surface violence to probe the souls of men in conflict Many critics consider Hem ingway the finest American writer of his time

 War. Hemingway tried to enlist but was rejected because of an old eye injury. He volunteered as an ambulance driver on the Italian front, and in 1918 he was badly wounded.

For a few years after the war Hemingway worked as a reporter. Then be settled in Paris. He bad already begun to write fiction, but now he applied himself seriously. He submitted his work for criticism to the poet Ezra Pound and to Gertrude Stein, an able adviser to many writers. From them he learned how to write with strength and direct simplicity.

His first two books did not sell well. His novel 'The Sun Also Rises' (1926) made bis name known. It

tells of young people in postwar Paris and how they grope to replace their lost moral standards. 'A Farewell to Arms' (1929) is about war on the Italian front. The romantic love story is interspersed with scenes of magnificent battle reporting. 'To Have and Have Not' (1937) represented Hemingway's first search for wider social meanings, more fully realized in 'For whom the Bell Tolls' (1940), a novel about the Spanish civil war. 'Across the River and into the Trees' was published in 1950 and 'The Old Man and the Sea' in 1952. Hemingway also wrote many short stories, a play, and books on bull fighting and big-game hunting. He won the Nobel prize for literature in 1954.

In the 1930's Hemingway lived in Key West, Fla. Later be moved to Cuba. He was a war correspondent

ERNEST HEMINGWAY



Hemingway wrote great novels and short stories of men in violent conflict.

in Spain, China, and in Europe during the second World War. He was married four times and had threesons HEMLOCK. An easy way to tell the hemlock from its relatives the pines, firs, and spruces is to note the branches and needles. The branches are plumelike and drooping, and the needles are short, flat, and blunttipped. They also are whitened beneath. The tiny oval brown cones lianging from the branches are usually only about half an inch long. In spring the tips of its dark-green sprays light up with the yellow-green color of new foliage. This contrast makes the hemlock one of the most picturesque of American trees.

Hemlocks are tall and pyramidal in shape. They grow to an average height of 60 or 70 feet. The soft wood has a tendency to warp. It serves as a substitute for pine and is widely used in interior decoration. The bark is used extensively in tanning.

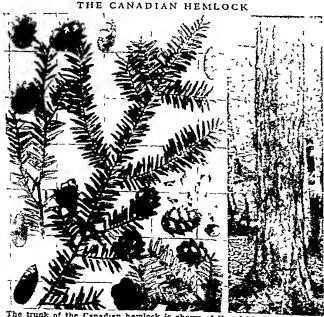
There are two chief species. The Canadian hemlock is found in eastern Canada and in the United State as far south as Georgia and as far west as Minneota The western hemlock is found on the Pacific coast and as far east as Montana.

The name hemlock is also applied to certain poisonous plants of the parsley family, which are widely distributed over the United States and Canada. The water hemlock (*Cicuta*) grows in marshy places. It is also called wild parsnip. It is one of the mot

poisonous plants of North America. The poison hemlock (Conium) grows in dry places. This is supposed to be the plant from which the ancient Greeks obtained the poison they used to execute criminals.

Scientific name of Canadian hemlock is Tsuga canadensis. The western hemlock is Tsuga heterophylla. The bark is reddish or gray, becoming furrowed with age. The leaves are linear and are one-half inch long. They grow singly and opposite each other. The cones are very small and thin scaled. The fruit consists of winged seeds HEMP. This flourishing plant serves the wise and destroys the foolish. Its fibermake valuable textiles, but it yields a dangerous narcotic drug, called "hashish," or "marihuana."

Hemp has been cultivated for thousands of years in its native Asia and was long ago carried to many other regions of the world. For centuries it was one of the most important raw materials for textilafibers. Rope, coarse cloth, and the sails of ships were made of it. The very name canvas probably comes from the Latin word cannabis, meaning "hemp." though canvas now is usually made of cotton.



The trunk of the Canadian hemlock is shown at the right. At the left are hemlock branches with their short, flat, blant needles and their oval cones. The tiny winged seeds spread the hemlock to new growing places. Wind often carries them to the sides of high mountains, where they take hold.



iall. A Japanese worker in the Philippines attript a static of Manila hemo cristole. The new years als end groun a to 12 ft. I living These will he accepted free of pulp and the fibers bung out to dry

The Cavaliers at Jamestown and the Pilgrims at Plymouth early planted hemp and from 14 wore their homespun clothes. From hemp were woven also the tops of covered wagons that carried pioneers into the West Modern Uses for Hemp

Today hemp as little used for rope because aboae (dasale hemp) as lighter and more resonato to well (dasale hemp) as lighter and more resonato to well Jule has sephaced hemp for making course solth and smular products (see Jule). But hemp as still weed widely for making strong and durable twines light with the second of packing Oil from the seeds is used in making some parties, and purposites Tips seeds are also fed to purposite.

Hemp fibers come from the inner bark of the plant a woody stalks After the stalks are cut they must "ret' or rot so the outer bark can be removed easily. The plants are either soaked in concrete nools or left on the ground to absorb run and dew Then the stalks are gathered and shocked Next they pass into a hemp break. Here tollers break the woody cores into short pieces ('hurds ) A scutcher with revolving drums combs out the long fibers ( line ) from the hurds The remaining short fibers ( tow") are cleaned by hand or a tow machine The production of hemp for its

the production of nemp for its fiber is an important industry in China, India, Russia Italy and Hungary In the United States hemp is a minor crop and the greater part of its supply is imported

A resinous substance in the leaves stems, and flowers of certain types of hemp is the source of hashsh, or marhunar. This has been used as a drug annea ameent times. It has a sinster effect upon habitual users, and many comtant ermes while under its influence (see Assassing Narcotics). The Federal government classifies marihuana as a narcotic during and cooperate with other nations to regulate its distribution and to prevent its abuse.

The term hemp is also used to designate fibers from such plants as Manda hemp (shaes), seal hemp and the Sunn hemp in India. These plants are not related to the true hemp plant. The sturdy abacs plant fiber grows 6 to 12 feet long. It is native to the Philip-

pince and belongs to the bananiamly it was introduced in Contrail America during the second World Var and became a successful crop. Abaca is used in ropes requiring strength and flexibitity, such as ships cables and in the best grades of twine. Sized is used for making topes of small dinameter end hard fiber twines (see Small)

All cultivated true betop is produced from Connodes storia This is an annual herb of the mulberry family varying under cultivation from a supplier rough the storial control of the sto



me," boastingly writes Father Hennepin, "would have been very much frightened at the dangers of such a journey as that upon which La Salle now dispatched me." This journey was to be from Fort Crevecoeur, near the present site of Peoria, Ill, down the Illinois River to the Mississippi, and thence up

HENNEPIN, LOUIS (1640?-1706?). "Anybody but

the Father of Waters towards its source
The man to whom was confided this
undertaking was a Franciscan monk
from Belgium. He had come to America
in 1675 on the same ship that brought
La Salle. Love of adventure and religious zeal led him to become a missionary
to the Indians, and in 1678 he was
overjoyed when he was given permission
to accompany La Salle on his great trip
of exploration.

Two years later he set out on his dangerous journey from Fort Creve-coeur. And dangerous it proved, for Father Hennepin and his two companions were captured by the Sioux Indians and carried in canoes up the Mississippi. While in the northern country Hennepin discovered the falls in the Mississippi where Minneapolis now stands. He named them the Falls of St. Anthony, after his patron saint,

St. Anthony of Padua. Soon Hennepin was released by the Sioux, and returned to Quebec and thence to France. There he published his 'Description of Louisiana' on which his fame rightfully rests. Unfortunately, some years later, after the death of La Salle, Hennepin published another book in which he claimed that he also went down the Mississippi and discovered its mouth before La Salle made his memorable journey. This falsehood has greatly dimmed the glory which rightfully belongs to Father Hennepin, because for many years people were afraid to trust his first accounts of what he really had done.

HENRY, HOLY ROMAN EMPERORS
Seven rulers of this name are counted in that union of Germany and Italy which is called the Holy Roman Empire (see Holy Roman Empire). Henry I, "the Fowler," was king of Germany from 919 to 936, but never concerned himself with Italy and his power even in Germany was weak outside of Sanony. Henry II, called "the Saint" (reigned 1002–1024), was the last of the Saxon house; he made three expeditions into Italy and was an earnest supporter

of Burgundy was added to the empire.

of church reform. HENRY III was a member of the

Salian line, and in his reign (1039-1056) the kingdom

Henry IV (reigned 1056-1106) succeeded his father, Henry III, when he was less than six years old. He grew up wilful and headstrong amid bitter contests over the regency. A few years after he took power into his own hands the storm of the Investigue conflict broke and lasted far into the reign of his son

The question was whether the Pope or Emperor-THE EMPEROR HUMBLES HIMSELF BEFORE THE POPE

When Emperor Henry IV defied Pope Gregory VII, his people revolted, and he was forced to journey across the Alps in the dead of winter to obtain the Pope's pardon. Here we see him at Canossa, after he had been kept waiting without lood for three days, ascending the steps barefooted and in penitent's tobe to kneel at Gregory's feet.

church or state—should control the appointment of bishops and other high clergy, who were not only high officers of the church but great feudal princes

exercising power in the state as well.

In 1077 revolts in Germany forced Henry IV to cross the Alps into Italy in the dead of winter, and abase himself before the Pope, Gregory VII, at Canossa Only after standing three days in the courtyard, fasting and barefoot, was he admitted

and the Pope's excommunication raised, on hard conditions It was the most brilliant victory that the papacy ever won over the temporal power It proved, however, to be only an incident in a long struggle which outlasted both Henry and Gregory

(See Gregory, Popes)

HENRY V (reigned 1106-1125) joined his father's enemies in 1104, and the elder Henry died in defeat at Liege, in what is now Belgium. The son, when once seated on the throne, became as staunch an upholder of the imperial claims as his father. In the Concordat of Worms (1122) the Investiture conflict was ended by a compromise, which guarded the just rights of both parties. Henry V died without children, and the throne then passed to the Hohenstaufen House

HENRY VI (reigned 1190-1197) was the third of the Hohenstaufen line, the able son of the great Frederick Barbarossa and the father of Frederick II, "the wonder of the world" (See Frederick, Emperors) The chief event of his short reign was his acquisition by marriage of the Norman kingdoms of

Sicily and Naplee

HEVRY VII (reigned 1308-1313) was the last emperor who sought to obtain the claims and traditions of the medieval Empire He died in Italy, frustrated in his attempts to restore any affective

umon of Itely and Germany

HENRY, KINGS OF ENGLAND Eight Henrys have sat on the English throne since this name was first introduced into the royal line in the person of Henry I, youngest son of the Norman conqueror, and all except two of these royal Harries (Henry III and Henry VI) were among the ablest sovereigns of that bland kingdom But the disfavor created by the comes and oppressions of the last of the series -tha tyrannical Henry VIII, father of Queen Ehzabeth Iwas so great that no English covereign since his time has borne this formerly popular name

HEARY I, who reigned 1100-1135, was called "Beauclere" because, unlike most princes of that age, he was a "good scholar" He is credited with saying that "an unlettered king is only a crowned ass" During the 35 years of his reign England enjoyed peace and prosperity The chronicler of those times wrote that he" was a good man and great was the awe of him, no man durst ill-treat another in his time"

At his accession Henry I issued a famous" Charter of Liberties" which became the basis of Magna Carta, the foundation of the liberties of the Anglo-Sexon world He also favored the church m order to wm its support against the pretensions of his elder brother Robert, who claimed the English throne in addition to the duchy of Normandy left him by their father The English were concultated by his marriage with Matilda, a descendant of the Anglo-Savon kings And the support of the common people was assured by his repression of the Norman nobles and by the justice he administered through the "King's Court" The"Lion of Justice," he was called

One misfortune darkened Henry's later years His only son was drowned when the White Ship sank in the English Channel, and, according to the story, the king "never smiled again" This accident left his daughter Matilda and his nephew Stephen contestants for the throne at his death (see Stephen, King of England)

Great Work of the First Plantagenet King

HENRY II, 1154-1189, was the son of Matilda, and the grandson of Henry I His father was Geoffrey



HENRY 11 The Piret of the Plantagenat Kings

of Anjou, called "Plantagenet" from his habit of wearing a sprig of the broom plant (planta genista) in his cap, so with Henry II, in 1154, the first Plantagenet king ascended the English throne Two years before he became king, as a lad of 18. Henry had led an army from France to assert his mother's claim, and

the weamed Stephen had agreed to a treaty by which Henry was recognized as his auccessor

Henry If was the most powerful prince in Christendom In addition to England and Normandy which he held by his mother's right, he inherited from his father, as French fiefs, the important counties of Anjou, Maine, and Toursine, and by his marriage with Eleanor of Aquitaine he acquired Poitou, Guanne, and Gascony, so that he held most of the British Isles and about one-half of France Frequent wars with his suzerain the French king followed, in which his rebellious nobles took unsuccessful part against him

Henry II re-established law and order after the anarchy of Stephen's reign He improved the milstary service by permitting the barons to pay "scutage" or shield money in place of serving in the army, with this he hired soldiers who would fight whenever and wherever he wished—an important means of keeping in order the powerful nobles of the land But his greatest work was the reform of the law courts The Cursa Regus was brought into every part of England by sending learned judges on circuit through the land to administer the "king's justice," so that gradually one system of law took the place of the many local customs that had been in use He also established the "grand jury" by which accusations could he brought by a body of representatives of the community against evildoers who were so powerful that no single individual dared accuse them To him also we owe the growth of the "petty" or "trial jury," especially in eases relating to land, this substituted the weighing of evidence and testimony by

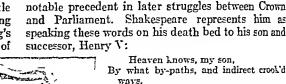
sworn men for the old superstitious trial by battle or by ordeal. Henry even attempted to bring churchmen who committed crimes under the king's courts, but the scandal caused by the murder of

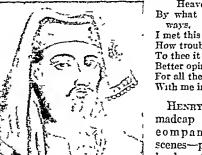
Archbishop Thomas Becket in the course of this quarrel forced him to give up this reform (see Becket, Thomas).

Henry's last years were embittered by the rebellion of his sons, aided by Philip Augustus of France and by their mother, the unscrupulous Eleanor. The king, old, sick, and discouraged, had to eonsent to the terms demanded of him. When he saw the name of John, his favorite son, among those of his enemies, he exclaimed, "Now let all things go as they will; I care no more for my elf, nor for the world." Two days later he died muttering, "Shame, shame on a conquered king."

HENRY III, 1216-1272, son of King John, was a religious man and a good husband and father, but he was a weak and incompetent ruler. Until he became of age officers trained under his grandfather, Henry II, directed affairs, and good order and prosperity prevailed. When Henry III took the administration into his own hands, he squandered the revenues of the kingdom on greedy relatives and favorites. The nobles scized upon his misgovernment as an excuse for rebellion in the Barons' Wars, under the leadership of the patriotic Simon de Montfort (see Montfort, Simon de). After Simon was defeated and slain in the battle of Evesham (1265), the people looked to the king's son. Edward I, for good government, and during the last seven years of Henry's reign the country was quiet and prosperous, the king being guided largely by the advice of his gifted son, Prince Edward.

The Lancastrian Henrys HENRY IV, 1399-1413, founder of the royal House of Lancaster, landed in England from unjust exile with only 60 followers. The 60 soon became 60,000. for all classes of people were tired of the mingled weakness and tyranny of Richard II, grandson and successor of Edward III, and he was now deposed and imprisoned. And Henry IV, claiming descent "by right line of blood from the good King Henry III," was seated on the throne by Parliament. But throughout his reign of 14 years his position was insecure and trying. The claim later asserted by the House of York was felt to be a better hereditary title to the throne than that of Lancaster. Scotland was restless, newly conquered Wales broke into open revolt, and the powerful family of the Percies, to whose aid Henry IV owed much in gaining the throne, took arms under the famous "Hotspur." So Henry perforce was obliged to keep on good terms with the church, and to permit the newly arisen Parliament to exercise powers in the government which became a





HENRY IV
Founder of the House of Lancaster

I met this crown; and I myself knowwell, How troublesome it sat upon my head: To thee it shall descend with better quiet, Better opinion, better confirmation; For all the soil of the achievement goes With me into the earth. . . .

HENRY V, 1413-1422—the former madcap "Prince Hal" of Falstaff's e ompanionship in Shakespeare's scenes—proved the hero-king of England. As king he "put away childish things," and was sober, clearheaded, and vigorous, so that he acquired the reputation of being "the

most virtuous and prudent of all the princes reigning in his time." He followed his father's advice to "busy giddy minds with foreign quarrels" by putting forth again the claim to the French throne, formerly raised by Edward III, thereby renewing the Hundred Years' War (eee Hundred Years' War). By his brilliant victory at Agineourt (1415) he eonquered all the northern half of France, and by a treaty five years later he married Princess Katherine of France, and it was agreed that he should become king of France also after the death of her father, the insane Charles VI. In the midst of his victories, Henry V died of eamp fever, leaving as heir to his rights in both kingdoms his infant son Henry, nine months old.

HENRY VI, 1422-1461, was one of the most unfortunate kings who ever sat on a thronc. While he was still a baby his uncle, the Duke of Bedford ruled for him, and for a time maintained and even extended the English conquests on the continent. Then the French were aroused by Joan of Arc, who raised the siege of Orleans and brought the young Trench king, Charles VII, to Reims to be crowned (see Joan of Arc).

Matters did not mend for the English when Henry VI grew to manhood. He was truthful, upright, and just, but he had neither the strength of mind nor of body to rule a kingdom, and for long periods he was insane like his French grandfather. War and business were never to his liking; he would rather have lived the life of a monk. So bit by bit the English lost the lands which they held in France, until only the city of Calais was left to them when the long Hundred Years' War ended, in 1453.

Meantime the misgovernment of Henry's ministers at home led to a rebellion under Jack Cade, in 1450, in which London was taken before the insurgents were overpowered and their leaders executed. Five years later began the bloody and merciless Wars of the Roses. In these Queen Margaret, Henry's French

### HENRY V S LONGBOWMEN BEGIN THE BATTLE OF AGINCOURT



ne ve emode gind nig u er edbefe u eigee om he of nig en omgrevimme vision i 186 ewes e lighely e og giftelse eige gig selfen heinig heede mit ede werde e dette og e hebe i selfigh ou I hee owere edfe. The Rog shwon po oddy hebe obt no hen Fincese ve ID englower un yend a heese mad strik me end med e knich I beston a one fe Moyer Na e ewet hep u e Har Je.

wife was the real head or the Lancastr an party and Ring Henry played only a feeble part. But in the course of the contest he lost his throne to the Yorkists his young son Prince Edward was slain and the king hurself was murdered in the Tower of Lopdon where he had been imprisoned (fee Roses Wars of the)

The Founder of the Tudor Line HENRY VII 1485-1509 who claimed descent from the Lancastrian House ga ned the throne by over throwing the last of the Yorkists When the battered crown of the usurper Richard III was p cked up on Bosworth F eld and placed on the head of Henry Tudor this seventh Henry the Wars of the Roses ended and with them the M ddle Ages in England He was the first modern king of that land He un ted the houses of Lancaster and York by marrying El zabeth of York mece of Richard III War had no place in the policy of this Tudor king who was called the Solomon of England and was regarded as the craftiest and stinglest prince of his time Abroad he secured his a ms by treat er and by the marriage alliances of his children. At home be in crea ed h s power by forb dding the great nobles to mainta n lawless bands of followers and by compelling them to obey the laws by means of his famous Court of Star Chamber (see Star Chamber). He thus laid the ba. s of that powerful Tudor monarchy as it came to his son Henry VIII and the great Pleacht I

Henry VII is also to be remembered becau c in his time the Renais ance (see Renaissance) was established in England. William Caxton had introduced printing nto England shortly before this and it was John Cad to sating by permission of Henry VII who laid the foundation for Englands claim to New foundation and the manified of North America.

Heart VIII 1509-1547 was educated in the New Learning and—before the death of has felder brother Arthur made him her to the throne—was needed for the archb shope of Constributy. He was a gay and handsome youth well skilled in sill manner of saffect genues though in later [6 he became course lat and ungainly. For nearly 40 years heruled England with a strong hand and frought about one of the most far reaching changes ever effected in the status of any language of the most far reaching changes ever effected in the status of any language.

he was betrothed to his brother's girl widow, Catherine of Aragon. During the first 20 years of his reign he left the shaping of policies largely in the hands of his great counselor, Cardinal Wolsey, who sought to give England importance by acting as an arbiter between warring Spain and France. On one

occasion Henry took part in France in the gorgeous display of the "Field of the Cloth of Gold," where he and the young French king, Francis I, met to wrestle, dance, watch tournaments, and talk of international relations and policies.

At the end of this period Henry professed doubts as to the power of the Pope to grant him the "dispensation" which the laws of the church had required in order that he might marry his brother's widow. Perhaps these doubts were strengthened by the fact that the only one of Queen Catherine's children to live was a sickly girl-the Princess Mary

—and it was doubtful whether a woman could succeed to the English throne. Then, too, Henry had grown tired of Catherine and had fallen in love with a young lady of the court named Anne Boleyn.

When the Pope would not annul his marriage, Henry in furious anger turned against his faithful minister Wolsey, deprived him of his office of Chancellor, and had him arrested on a charge of treason (see Wolsey, Cardinal). He then obtained a divorce through Thomas Cranmer, whom he had made Archbishop of Canterbury for the purpose, and it was soon announced that he had married Anne Boleyn. The Pope was thus defied. All ties that bound the English church to Rome were broken. Appeals to the Pope's Court were forbidden; all payments to Rome were stopped; and the Pope's authority in England was abolished. By an act of Parliament, Henry himself was declared "Supreme Head of the Church of England," and to deny this title was made an act of treason. Some changes were also made in the church services, and the Bible translated into English and printed copies placed in the churches. The monasteries throughout England were dissolved and their vast lands and goods turned over to the king, who in turn granted those estates to noblemen who would support his policies. In the northern part of the kingdom the people rose in rebellion in behalf of the monks, but their "Pilgrimage of Grace," as it was called, was put down with bloody cruelty.

Although Henry reformed the government of the church, he refused to allow any changes to be made in its doctrincs. Before his divorce he had opposed the teachings of Luther in a book which had gained for him from the Pope the title "Defender of the Faith"—a title the kings of England still bear. And

after the separation from Rome he persecuted with equal severity the Catholics who adhered to the government of Rome, and the Protestants who rejected its doctrines.

With equal bloodthirstiness he put to death every possible claimant to his throne. Among other victims whom he sent to the block were two of his wives, for he was married six times. You may perhaps have heard the old jingle:

King Henry the Eighth to six wives was wedded. One died, one survived, Two divorced and two be-

headed.
Anne Boleyn bore the king one child, who be-

HENRY VIII

HENRY VIII England's Royal Bluebeard

came Elizabeth I. Henry soon tired of Anne and had her put to death. A few days later he married a third wife, Jane Seymour. She died in a little more than a year, after having given birth to the future Edward VI. A marriage was then contracted with a German princess, Anne of Cleves, whom the king had been led to believe to be very beautiful. When he saw her he discovered that he had been tricked; and he promptly divorced this wife and beheaded Thomas Cromwell, the minister who had arranged the marriage. His fifth wife, Catherine Howard, was sent to the block for misconduct. But the sixth one, tactful Catherine Parr, managed to survive this royal Bluebeard and lived to marry her fourth husband.

HENRY, KINGS OF FRANCE. Four kings of France have borne the name of Henry, of whom the last west the greatest. Henry I, who ruled 1031-1060, was a contemporary of William the Conqueror, of England, and was defeated by that invincible warrior when he attempted to assert his authority over the duchy of Normandy. Under Henry II (1547-1559) began the religious persecution of the Huguenots, which laid the fuse for the religious wars after his death. He died in a tournament, when a splinter from a lance entered the eye-hole of his helmet and penetrated to his brain; in this, Protestants saw the hand of Protidence. The utterly worthless Henry II (1574-1589), the last of the three weak sons of Henry II and Catherine de Medici, was for a brief period

elective king of Poland before he succeeded to the throne of France. His death by an assassus a hand in the course of the Huguenot wars opened the succession to his Protestent rival. Henry of Navarre.

HENRY IV, king of France end Navarre who reigned from 1589 to 1610 was the last and greatest of the Henrys He was

king not only of France but also of the small independent kingdom of Navarre on the northern slope of the Pyrcnees In 1569 when he was 16 years old, his mother Jeenne d Albret the Huguenot queen of Navstre placed him in the care of Admiral Columny the brave Huguenot leader (see Coligny, Gaspard de) From that time until his accession as king of France Henry of Navarre was the rec canzed leader of the Huguenot party but for a short time efter his marriage to the Linea sister, Margaret of Valous, and the subse-

quent masserre of St

Barthelomew's Day, he

ecemed to renounce the

HENRY IV

Now glory to the Lord of Hosts from whom all glories and And glory to our Sovereign Liege King Henry of Navariati

Proteins feath in his tolerant easy going way At the death of Heary II in 1599 Heary of Navares was the heir to the throne of France But his right of succession was disputed by the poperful Iddy Lesgue saided by King Philip II of Spain and he was not crowned until he had enforced his son of the way only one and he was not crowned become a member of the Catholecchurch The victory was practically won at the battle of Irvy, in 1590 which Macaular has rendered

famous by his poem of that name beginning— Now glory to the Lord of Hosts from whom all glories are And glory to our Sovereign Logs King Heavy of Navarrel

Henry IV also set about restoring the prosperity of the land My wish' he said is that every persant in the kingdom should be able to have a chicken in the pot for his Sunday dumer'. Again culture said manufacture were encouraged by him and roads repaired so that commerce imight be benefited

The improvement in the condition of the people, which he was added by his great number the Dube of Sully, and the agreeable personality of Heory IV, the first of the Bourbon lange combined to render but the most popular king France has ever had IV was struck down by the danger of a religious assessing as he was riding through the streets of Pars, feaving the throne to havy young son Louis XIII.

Although be conformed to the Catholic church Henry IV did not lorget the claims of his former religious associates. The Edict of Nantes which he issued in 1598 gave the Huguenots equal political rights with Cathol as the right to reside freely any

where in France freedom of private worship in their own homes and public word in in certain places inot including the king a court or within five leagues of Paris) and the government of La Rochello and a few other strong places as cities of refuse This edict remained in force with some modifications for nearly e hundred years (see Louis Kings of France)

HENRY, PATRICE (1736-1799) The stir ring words of Patrick Henry Give me liberty or give mo death fur in hithe keynote of that famous orators public career As en sgitter and a champion of the common people he had no equel in his day

Patrick Henry wer born in east-central lir stock and received such

gams of good Sostiuch stock and receased such cheeration as the scanity opportunities of the two may permitted. But he was a venturesome end fun bromg youth and give up has stude as the region of 15 to enter business. Three times within the next scene, years he failed—twice as storekeeps adonce, as a farner. Commend that he had no shill yet no teller of these fields he next turned has attended once as a farner. Commend that he had no shill ye me there of these fields he next turned has attended have a born talker. After a few weeks of study, he was admitted to the bar. He succeeded immediately as a pleader before frontier juries and has scondardown that during the first three years of practice he collected fees in 1155 cases.

In 1763 Patrick Henry supported the people arount the established church in a case known as the \*Paron, a Cause Daring the trail of the case in the state of the same that a time by velousg sabstary acts of a colonial legalature degenerate units a tyrent and forests all right to his subjects obethence that is not because the same than the same training to the same that are the same than the same training to the same than the same training to the same than the same training to the same than the same tha

not knowing what course to take in regard to the Stamp Act, Patrick Henry brought in a series of

resolutions, declaring that the English Parliament had no right to tax the American colonies. In the dehate which followed, Henry exclaimed with terrifying holdness: "Caesar had his Brutus; Charles the First, his Cromwell; and George the Third Here he was interrupted hy loud cries of "Treason! Treason!" from memhers of the House. Pausing for a moment Henry coolly added: "And George the Third may profit by their example. If this be treason make the most of it!" This fiery speech secured the adoption of the resolutions. By his fearlessness and his eloquence Patrick Henry had hecome the spokesman for the colonial cause in the southern colonies, as James Otis and Samuel Adams were in New England.

PATRICK HENRY In 1774 Henry was sent by Virginia as The Orator of the Revolution a memher of the first Continental Congress, where he declared in ringing tones, "I am not a Virginian, hut an American!" Next year at the second revolutionary "convention" called in Virginia, he made his most frequently quoted speech, in urging the colony to arm her militia:

"Gentlemen may cry peace! peace!" he said, "hut there is no peace! The war is actually begun! The next gale that sweeps from the North will bring to our ears the clash of resounding arms! Our brethren are already in the field. Is life so dear, or peace so sweet as to he purchased at the price of chains and slavery? Forhid it, Almighty God! I know not what course others may take; hut as for me, give me liberty, or give me death."

No one contributed more to arouse the people of Virginia, and a few months later Henry was appointed commander-in-chief of the Virginia troops. He soon quarreled, however, with the Committee of Public Safety, which acted as the governing hody of the colony, and resigned his commission. This was perhaps fortunate, for Henry had greater talents as an agitator than as a military leader.

Patrick Henry also aided in drawing up Virginia's state constitution in 1776, and was elected first governor of the state. He filled this post moderately well and was three times reëlected. It was with a commission from Governor Henry that George Rogers Clark set out to conquer the territory northwest of the Ohio from the British.

Henry Opposes the Constitution

In the Virginia convention of 1788, called to ratify the new constitution of the United States, Patrick Henry bitterly opposed the adoption of the new form of government, which he believed was dangerous to the liberties of the country. He objected to it because it contained no "bill of rights," because it infringed too much on the rights of the States, and hecause (as he said) it would prove "one great consolidated national government of the people of all the States," instead of a mere confederation. And he

asked, "Who authorized them (the framers) to speak the language, we the people, instead of, we the States?" Fortunately Henry's advice to reject the Constitution was overruled by the wiser counsels of Washington and Madison; hut as a result of such opposition the first ten amendments to the Constitution were adopted, known as the "hill

of rights." Henry refused all offices under the new government. In 1799, however, he consented to serve again in the Virginia legislative assembly, but he died before he could take his seat. Long before that event he had hecome reconciled to the Federal Constitution whose adoption he had so hitterly opposed.

HENRY THE NAVIGATOR (1394-1460). "It is said, Sire," remonstrated the sailor, "that he who crosses the Sea of

Darkness will be changed into a black-God's vengeance on his insolent prying; that he will reach the Devil's ocean that boils day and night with fiery heat; and that he will find its hellish coasts fringed with sea monsters, serpent rocks, waterunicorns, and other fearsome creatures!"

Prince Henry of Portugal, that munificent patron of voyagers and explorers and one of the heroes of modern discovery, laughed at his captain's fears. "The sea is as easy to sail in as the waters at home," he told him, "and the land very rich and pleasant Heed not these idle tales; for, by God's help, fame and profit must come from your voyage, if you will but persevere."

Prince Henry did more than any other single person to make the 15th, 16th, and 17th centuries the great Age of Discovery. For 50 years he kept encouraging his countrymen to sail down the west coast of Africa, so that before his death they had pierced through into the unknown South for nearly 2,000 miles.

A Man of Amazing Energy Henry the Navigator, as he is called in honor of the discoveries he inspired, was the fifth son of John 1, king of Portugal, and of Philippa, daughter of the English John of Gaunt. He early distinguished himself at the conquest of Ceuta, the "African Gibraltar," in 1415. Soon afterwards he moved to Sagres, a town close to Cape St. Vincent, where he resided for a great part of his life. While warring against the Moors of Africa, he became greatly interested in this mighty continent, and longed for a better knowledge of the western ocean and the discovery of unknown regions. He founded an observatory and also a school where young men could learn navigation. Then he hegan sending out expeditions. One by one the rich islands of the Azores, Madeira, the Canaries, and Cape Verde were discovered, and the African coast was explored as far as Sierra Leone. "Explore,

trade, convert!" said Prince Henry to his men. All

this they did, and—less happily—began trading in

captured African slaves.

Prince Henry died before the full results of his work were seen These results, which made people at last realize that the oceans were not great lakes in a world of land were credited to others But the real master of the bold sailors who discovered America, rounded the Cape of Good Hope reached India and finally tocareled the globe was Henry the Navagator

HEPATICA Sometimes while wandering among the woods and hills in early spring you come upon little clumps of delicately tinted flowers in fuzzy coats which raise their lovely heads through the old dead forest leaves, like the dainty faces of a bevy of patrician ladies muffled in their furs. There are the hepaticas What charm they have there little blossoms of blue, lavender, pink, or white-no two clusters alike in shade or size! Even the gift of fragrance is not entirely denied them, but, in the language of John Burroughs, ' seems as capricious as the gift of genius in families" Sheltered from the frost by their rusty evergreen leaves, and warmed by the late winter sunshine, they bloom even under the snow stself, on shaded hillside or in woodland dell. And then, efter the blossoms, come the new green leaves -rounded, leathery, and glossy green, sometimes mottled with purple-to replace the last years weather-worn foliage There are many spring blossoms to follow, but none is fairer than this brave little wilding of the Crowfoot family that heralds the spring from Nova Scotta to Florida and westward to Mani

toba, Iowa, and Missouri Scientific name Hepatus triloha. The flowers growing singly on alender atems, are about three-quarters of an inch broad and have ô to 12 petal like sepale enclosed in three funsy reddish green leaflets. In the center are numerous patils and anther-bearing etamens. There is no corolla the tepals taking the place of ord nary petals. The alcoder harry stems, springing from the roots are from 4 to 6 mobes tell and each bears a flower or leaf. The 3 lobed evergreen leaves are thick and liver shaped whence the name hepat-

ica' (from the Grook meaning 1 ver ) HEPHAESTUS (he fee the) The lume god Hephaestus (Roman Vulcanus), the son of Zeus and Hera was the god of fire and the forge He was lame from birth, according to some stories, but others ascert that he was emppled by being hurled down to earth by Zeus, falling on the island of Lemnos where he built e palace, with a workshop and anvil He also had a beautiful palace in Olympus, or, according to others, under Mount Aetna, on the island of Sicily Here with the help of the Cyclops, the one-eyed grants he made the thunderbolts of Zeus, the armor of Achilles, and the weapons of Hercules He was also aided by handmaidens whom he had made of gold and endowed with hie All the palaces of Olympus were built by him In the Homeric poems the kind hearted but lumping god is represented as a come figure whose deformity provokes "mex tinguishable laughter' in the other gods. He was the patron derty of the metal workers.

HERA (he ra) By the side of Zens on Mount Olympus, as the Greeks believed, reigned his stately wife Hera (called by the Romans Juno), queen of the

gods Their life was not always one of harmony, however, for Hera was quick to anger and Zeus frequently gave cause for jealousy. Hera was the goddess of womanhood of marriage, and of materiaty. The peacock, the cuckee, and the pomegranate were sacred to her She was usually represented as a beautiful majestic woman of mature age, with large wide-open eyes and grave expression inspiring reverence Homer speaks of her as the 'white-armed goddess' and the "ov-eyed queen" The most famous statue of Hera was the one by Polychtus in the temple at Argos This was a colossal image, in rvory and gold representing the goddess seated on her throne, wearing a crown and bearing in one hand a pomegranate and in the other a scepter with a cuckoo at the too

HERALDRY In the Middle Ages, when knights wore armor that completely covered their heads and bodies there grew up the custom of emblazaning devices on shields and surcosts so that the wearers could be distinguished By slow degrees an elaborate science of heraldry developed Strict rules were laid down regulating the assumption and design of armorial bearings, and colleges of heralds were founded to enforce observance of the rules Most of the terms used in beraldry are French, because that language prevailed while the science was growing up

Several coats of arms are often arranged or "marshalled on the same shield or 'escutcheon' to show descent, marriage alliance, etc. To enable this to be done the shield is divided into halves by a single line extending across it vertically, disgonally, or horizontally, or it is divided into "quarters" by a cross-chaped arrangement of lines, and these quarters may be further subdivided The colors or tinctures ' are called or (gold), argent (silver), gules (red), asure (blue), sable (black), tert (green), and purpure (purple)

The 'charges' or devices are of infinite variety Some are wide bands variously named according to the direction in which they cross the shield. Thus the' pale' extends from top to bottom, the' fess' is a horizontal band in the middle, and the 'bend' crosses diagonally from the upper left-hand corner (dexter chief) to the lower right-hand corner (simister buse) The bend smister, crossing from upper right to lower left, is popularly but erroneously considered a mark of illegitimacy Other common charges are simple geometrical designs and others are conventionalized representations of animals, flowers trees leaves, etc. The animal most frequently used a the hop, which may have several positions rampant (erect on the hand legs), passant (walking), couchant (lying with the head raised), dormant (asleep), etc

Heraldry gets its name from the heralds of the Middle Ages, who were the official representatives of kings and lords The heralds were also the court chromolers and it was their duty to keep track of family relationships and of the intricate effourtte

governing coats-of-arms

HERBERT, VICTOR (1859–1924). One of America's best-loved composers was a big, hearty Irishman named Victor Herbert. He wrote more than 30 operettas, each filled with delightful, melodious songs. Dozens

VICTOR HERBERT



Wherever people like to sing, Herbe-t's melodies are still enjoyed.

of them remain popular favorites. 'A Kiss in the Dark', 'Ah, Sweet Mystery of Life', and 'Toyland' are among the Herbert songs that people love to sing and whistle.

Herhert himself enjoyed life hugely. He liked gaiety, excitement, and public attention. He worked hard, and he ate and drank heavily. Poor musicians always found him generous with gifts and loans.

Herbert was a leader of several Irish-American organizations and was one of the founders of ASCAP (American Society of Composers, Authors, and Publishers).

The composer was born Feh. 1, 1859, in Dublin, Ireland. His father died when Victor was an infant. Victor spent his childhood in the spacious London home of his mother's father, Samuel Lover. When he was seven, his mother took him to Stuttgart, Germany, for his schooling. Victor first learned to play a piccolo, then took up the cello. He entered the Stuttgart music conservatory in 1876, and within a few years he was playing professionally.

In 1883 Herbert hecame first cellist for the Stuttgart Court Orchestra. He became engaged to Therese Foerster, a young opera singer from Vienna. She accepted a contract from the Metropolitan Opera Company in New York City on condition that they take Herbert as well. He was hired as first cellist. They were married in August 1886, and sailed to New York soon after. At first Therese Herbert's career overshadowed her hushand's. But after several years she retired to rear their two children. Meanwhile, Herbert had played first cello under Theodore Thomas and was made assistant to Anton Seidl, both famous conductors. In 1894 he hecame handmaster of the Twenty-second Regimental Band. About the same time he wrote his first operetta, 'Prince Annaias'.

Herhert conducted the Pittshurgh Symphony Orchestra for six years (1898–1904), then returned to New York City to form his own orchestra. He continued to write operettas, sometimes several a year. He also wrote many works for choral groups and orchestra. Among his most successful operettas were 'Babes in Toyland', 'Mlle. Modiste', 'Naughty Marietta', 'The Red Mill', and 'Sweethearts'. But Herbert could never find a writer who could prepare text to match his music. His two serious operas failed largely because of poor plots. He died May 26, 1924.

HERCULES (hēr'kū-lèz). The most celebrated of all the Greek heroes was the mighty and great-hearted Hercules. (The Greeks called him Heracles.) He was the son of the god Zeus and the mortal Alemene. The goddess Hera (Juno) hated Hercules from his birth and sent two serpents to destroy him in his cradle. But the infant strangled them. The boy Hercules was trained in manly accomplishments by the centaur Chiron and other heroes.

When Hercules was a young man, two beautiful maidens came to him. One was Arete (virtue); the other, Kakia (vice). Kakia offered him ease, pleasure, and riches if he would follow her. Arete offered him only glory for a lifelong struggle against evil. Hercules chose to be guided by Arete.

Twelve Labors Performed by Hercules

In a fit of frenzy caused by Hera, Herculæ slew his own children. To atone, he was forced to serve his cousin King Eurystheus. He was compelled to perform the great tasks known as the "twelve labors."

The first labor was the slaying of the Nemean lien. Hercules strangled the animal and wore the lien's skin as a garment. Next he slew the Hydra, a terrible nine-headed water serpent. His third task was the capture of the wild Erymanthian boar. The capture of the Ceryncian stag, an animal with golden horns and brazen hoofs, was the fourth labor.

The fifth labor was to kill the Stymphalian birds, which fed on human flesh. The sixth was to clean the Augean stables that held a herd of 3,000 oven. Their stalls had not been cleaned for 30 years. Hercules turned two rivers, the Alpheus and the Peneus, through the stables and finished the work in a single day. As his seventh labor he captured the Cretan

HERCULES



This majestic head is from a statue in the British Museum, London.

bull. Next came the capture of the flesheating wild mares of Diomedes, king of Thrace. Hercules killed Diomedes and threw his body to the horses. He then had to obtain the belt of Hippolyta, queen of the Amazons. He defeated her warriorwomen, killed the queen, and escaped with the helt. The tenth labor was to capture the oxen of Geryon, which dwelt on the fabled island Erytheia beyond the Strait of Gibraltar.

On his way Hercules erected the rocks on either side of the strait (the Pillars of Hercules). His eleventh task was to hring Cerberus, the many-headed dog who guarded the gates of Hades, up from the underworld. Hercules brought the dog before Eurystheus. The king was so terrified that Hercules had to return the monster to Hades Finally he had to obtain some golden apples guarded by four sister nymphs called the Hespendes Their father Atlas had to hold up the heavens but Hercules did this for him while Atlan took the apples

Hercules was now free but he performed atterfeats At length the centaur Nessus tred to carry off Her cules wife Delanira Hercules shot Nessus with a poisoned arrow The dying centaur had De anna keep some of his blood as a love charm. Soon Hercules fell in love with another maiden, and De anira sent him a robe steeped in the blood. When Hercules put it on po son spread through his body I ke fire He fled to Mount Octa built a funeral fire and threw himself on it to die

Hercules heroic strength has inspired many works of a t Tie finest representation in sculpture is the so-called Farnese Hercules in the National Museum at laples It is a copy of an earlier work by the anc ent sculpter Lys pous

### How HEREDITY WORKS to Pass On TRAITS

HEREDITY As everyone know children often resemble the r narents. A boy for example may be tall or broad shouldered like his father while a girl may have her mother a wavy hair Children of

blonds usually are blond and blue-eye I parents are almost sure to have blue-eyed sons or daughters

These resemblances are brought about by heredit! the process which passes on tra ts or characters from parents to the r offspring Besides

THE SIMPLEST TRANSMISSION OF CHARACTERISTICS td ty is generally taken to mean the fransmiss on of characters from sut transmiss on a 40 occurs when a cell div des by matous First gra ofnatin which determines hered ary characte's forms a long thread

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tes form a fiel plate which we see edgewise.

In the to ownhe rea 4 In the for wring amphase, the fir der champeoner are put of sper by the spind of fibers so that one set of thromesomes can go into each new cell

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making most children look like their fathers or mothers heredity gives all of us the characters of body and mind that make us hu man beings Heredity also deter mines that hens eggs shall develon ento chicks that aen as shall become oak trees and so on for all living th ngs

While plants and an malausually breed true the workings of he redity may also bring hidden char acters to light and arrange old ones in ne v combinations Thus it evoluing why brunette parents sometimes have red haire I chil dren and why the seeds from p nk four-o clocks become plants with p ak red and white flowers

Heredley Has Been a Puzzle People have known about hered ity for ages and have made many unsuccessful efforts to evplain it Some said that hered ty was car ned by blood and we still hear the word blood used to mean race or ancestry Others thought that tiny creatures appeared ready made in the reproductive cells of man and some other and mals and grew to full size at the appropriate t me

Saveral attempts were made to evolum hered ty as a transm ttal of effects produced by use and d suse Supposedly these life ex perien es caused some organs to grow larger and stronger but al lowed others to dwindle away and the changes were passed on to fater generations

All such explanations failed when biologists proved that such

characters could not be passed on from one generation to the next. The same fate met attempts to explain the inheritance of changes produced by climate, food, and other external factors.

The subject of heredity was brought to worldwide attention when Charles Darwin announced his theories of evolution in 1859. Though Darwin did not explain how inheritance takes place, he did declare that variations which were transmitted could account for all the forms of plant and animal life, living and extinct, on the earth (see Darwin; Evolution).

About this time an English anthropologist, Francis Galton, began to study heredity in human beings. He established many facts about the inheritance of traits such as color blindness. A German biologist, August Weismann, showed that heredity commonly depends upon special material called germ plasm, which is more complex than other living material.

Mendel's Experiments with Peas

Most hiologists consider, however, that the modern science of heredity rests upon the work of Gregor Mendel, an Augustinian monk who became abbot of a monastery at Brunn (now Brno, in Czechoslovakia). From 1854 to 1863 Father Mendel bred peas in the garden of the monastery. He began by selecting varieties that differed in pairs of contrasting characters such as tall or short vines, red flowers or white ones, and seeds that were green or yellow. (Such contrasting characters are called allelomorphs.) He also made sure that his peas were "pure" for each character. This meant that no traces of the opposite character were hidden away in their hereditary make-up, to appear at a later time and spoil his experiments.

Having done this, Mendel crossed peas which differed in one set of characters, such as the color of the flowers. At that time people thought that such characters hlended to produce off-pring of an intermediate type. The crosshred offspring (hybrids) of red and white peas, however, were not pink. They were all red. All members of this first generation of hybrids (the F1 generation, as Mendel called it) resembled only one of their parents. The same was true of other pairs of opposite characters which

Mendel combined in separate experiments.

The missing character had not vanished, however, as he found when he interbred the hybrid peas. In the next (F2) generation, three fourths of the plants had red flowers and one fourth had the white flowers which had been missing in the F1 generation. Actually there were three kinds of peas among his F2 plants. Mendel discovered this when he bred still another (F<sub>3</sub>) generation.

His breeding records for the F<sub>3</sub> generation showed that one fourth of the F2 generation had heen "pure" for white and produced only white offspring. One fourth had been pure for red and produced all red offspring. The remaining two fourths, or one half, proved to have both red and white in their hereditary make-up. Like the F1 generation, they were redcolored hybrids, and they produced red and white offspring in the ratio of 3 to 1.

Finally Mendel crossbred peas that differed in two and three pairs of characters. For example, he crossed peas having smooth yellow seeds with others that were wrinkled and green. All the F<sub>1</sub> hybrids then had smooth yellow seeds. But all four characters reappeared in the F2 generation. The combinations were smooth yellow, smooth green, wrinkled yellow, and wrinkled green, with ratios of 9:3:3:1.

### Mendel's Great Discoveries

Father Mendel published an account of his work in 1866. At that time, however, biologists were deeply stirred by Darwin's theory of evolution. They did not realize the importance of these detailed experiments with peas. When Mendel's report was rediscovered in 1900, biologists found that he had made four important discoveries:

1. Many characters (or the things that produce them) are inherited as separate units. These do not mix, even in hybrid organisms. The character-producing units may also seem to disappear and still not be lost. This happened in Mendel's F1 generation of peas.

2. Different characters may separate and then combine in various ways when hybrids interbreed. When Mendel crossbred smooth yellow and wrinkled green peas, for example, the hybrids produced an F2 generation containing these characters in four different

combinations.

3. When organisms with contrasting characters mate, one character may hide the other in the mixed. or hybrid, offspring. The hereditary factor that makes pea flowers red, hides or dominates the one for whiteness. Mendel described the hidden characteristic as recessive. Even when dominance is not complete it explains many supposed irregularities in heredity.

4. The most important discovery was one which Mendel did not state clearly. This was the fact that heredity is an orderly process, capable of producing results with almost mathematical precision. This meant that scientists could study inheritance of characters experimentally. They did not have to rely only upon observation and speculation as they had in the past. Thus hiologists who applied Mendel's principles and methods were able to huild up genetics, the science of heredity.

Heredity Granules and Chromosomes

Mendel explained his discoveries by supposing that tiny grains or gianules control hereditary characters. One granule, he said, produced yellow peas; the opposite granule made them green. Other granules caused plants to become tall or short, made flowers red or white, and so on. In scientific terms, Mendel believed that each kind of granule determined one or the other characteristic.

Granules like those which Mendel described are found in members of the moneran kingdom, which includes the simplest of all living things (see Life). Both bacteria and blue-green algae contain tiny bits of material known as chromatin (a term that means "colored substance," because it can he stained by certain dyes). When monerans reproduce, their chromatin gathers in structures called chromosomes, which

# How Garden Peas Demonstrate Mendel's Law

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Color of Flawers Heredity Color Corners Pure Strains Red flowers 🏂 Carrers Red 49 White (II) White flowers A Hybr d carriers O O Hybrids (Crossed red and white) Flower color Red White (1) **Pure Strains** Red flowers White flowers 2nd flowers White Howers 22 22 തര @@ Parents 2222 Offspring ದಿದಿದಿದ തതത Offspring Results of Crossing Red and White 20 Mendel's Generations (F, F, Fa) Parents  $\mathbf{0}$ Offspring Offspr ng 2222 തതത (Hybr da) Results of Mating Hybrids HE HE Parents 232 രമ Parents യ

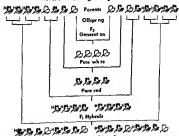
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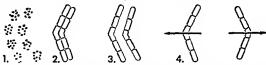
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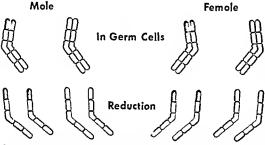
# How Characters Are Passed On

Chromosomes in Simple Cell Division



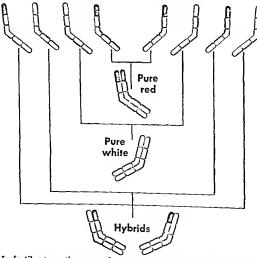
1. At the start of a simple "mitotic" division of one body cell into two, every cell has scattered granules of chromatin These contain the determiners (called "genes") of inherited characteristics 2 The granules organize, like beads on a string, into "chromosomes" Then each chromosome (and each gene in it) prepares to split lengthwise into a pair of chromosomes with genes (For simplicity, only one such chromosome with five sections is shown) 3 The divided chromosomes pull apart within the cell 4 Finally the cell divides, and each new cell has its chromosome

Chromosomes in Sexual Reproduction



Sex cells arise from germ cells which contain paired chromosomes. In body cells, chromosomes must be paired in this way to be effective. The upper row of diagrams shows these chromosomes, with corresponding segments that carry the gene for red or white flowers as they do in pure strains. Complex division produces mature sex cells with only one chromosome (lower row). This is called "reduction". These cells produce a new individual when corresponding chromosomes from each sex are joined in pairs.

How Chromosomes Join in Reproduction



In fertilization, the genes for red and white flowers (whichever are present) match up by chance (For simplicity, they are shown at the top of each chromosome) In a large number of mixed matings, the matchings will average one red-red, one whitewhite, and two red-white, as in Mendel's F<sub>2</sub> generation

then divide lengthwise into identical halves One set of halves goes into each new moneran, thereby transmitting the characters of the parent

Monerans are so simple that their chromosomes seem to be scattered through the cell. In more complex organisms these structures are kept in a flattened or ball-shaped nucleus which is the living center of the whole highly organized cell.

Chromosomes range in shape from lumps to bead-like chains or structures bent like the letter V. While cells are growing or "resting," chromosomes break down into granules which are scattered through the nucleus. To prepare for cell division, the granules again form chromosomes, and these split lengthwise, forming two similar sets. These sets then are pulled apart while the old cell divides into two. Each new cell gets a set of the split chromosomes.

Mitosis and Sexual Reproduction

This simple sort of division is called mitosis. It occurs when body (or somatic) cells of larger plants and animals form two new cells of the same kind One-celled creatures such as the amoeba employ it for reproduction (see Amoeba). In either case, the new cells have the same number of chromosomes as the old one, and a certain number is characteristic of each species. Cells in houseflies, for example, have 12, garden peas have 14; and earthworms have 32. A horse's cells contain 60 chromosomes, and those in one species of crayfish number 200. The cells of a human being have 48 chromosomes

Most complex (many-celled) plants and animals reproduce sexually. This means that the body, or somatic, cells can only divide into others of the same kind. A new individual can only be produced by union of sex cells, formed by special organs in male and female parents. The male cell is called a sperm, and the female cell an egg or ovum.

These cells also contain chromosomes, which divide and reunite during reproduction, in a special way. It was easy to guess that the chromosomes were hereditary carriers; and in the course of years, many biologists contributed proofs that this is the case. Perhaps the most extensive proof was offered, beginning in 1910, by the American Thomas H. Morgan and his many pupils and associates from experiments with the fruit fly, Drosophila melanogaster.

Drosophila (pronounced drō-sŏf'i-la) was an ideal organism for the purpose. The life cycle, from egg to egg, may take only ten days. This makes for speedy study Study was simplified because the cells have only four chromosomes, and in certain organs these can be seen in so-called "giant" size. Finally, Drosophila can be made to show many variations, such as eye color and wing shape.

Chromosome Changes during Reproduction

In higher plants and animals, chromosomes exist in pairs For example, the 48 chromosomes in a human body cell are in 24 pairs. This paired arrangement seems necessary if the cell is to hive and function

The germ cells which give rise to sperm and eggs also have paired chromosomes. Mature sex cells, read)

for reproduction, are produced by a series of changes shich leave only one chromosome from each pan. When an egg and a sperm unite, thereby fertilitizing the egg the single chromosomes join to form similar pairs. These make the proper number for the species.

Geneticists also learned how the sex of a new indivalual is determined when they found that certain female insects have one more channosome than the nules. It was relatively easy to show that this ext is chromosome, called X, determined the inheritance of several characters found only in the irrade bugs.

Later discoveries revealed plints and amounts in which the female has two \(\chi\) chimosomes while the male has only \(\chi\) and a smaller chimosome while the male has only \(\chi\) and a smaller chimosome called \(\chi\) In still others the male has two \(\chi\) s and the female \(\chi\) and \(\chi\) The set of a new individual is determined by the presence or absence of an \(\chi\) chimosome one or by whether an \(\chi\) chromosome combines with another \(\chi\) or with \(\chi\) in the fertificed cell which gives use to the new animal or plant

Identification of Genes in Chromosomes

Counties studes made in the light of Mendel's findings proved that a new incideable whereing findings proved that a new incideable whereing is made up of thousands of thats or characteristics is made up of thousands of thats or characteristics. Some are inherited in group, others are tanswired more or less independently of any others. For early sevence in analyzing the facts biologists did the current of each trait, whatever the current might be a zero.

Since those unde of tents are suberated, there must be many more genes than there we chomosomes But merascopic examination shows that this more contential to the substantial to the substantial tents of the genes or groups of closely linked genes. The actual nature of the genes, or determining letters, is inwithin question. Most biologist's below the subting the substantial tents of the substantial tents of the substantial tents of the substantial and produce whitese that or traits the gene or genes in the land may control

Complex Types of Heredity

The variety combinations shown in diagrams eabler the article occur with almost mathematical precision, according to how the genes happen to combine in the case of many traits, however, the transmission bundle more complex. A few cases even depend upon sense that act in proups or in combination with interfactors, some of which are not inherited.

Among human beings for example several pairs of dominant genes produce the dark skin of a Negro while the same number of recessive genes determines the pulsskin of a white. When all the genes us of one kind the skin color is pure, but when whites and Negroes intermarry, the T<sub>1</sub> and later generations produce many different deserses of color

different degrees of color Scentists once were puzzled by the fact that a yellowish variety of mouse never "breeds true" or is pure, for this character Then they found that the sense for yellow hair cause death if two of them are present. Many similar "killer," or kilasi, genes have been found in other nigmals and plants



on a lrust fly larva. The chromosomes are of so-called 'giant' are They show clearly how each chromosome has many disks or knots slong it These segments supposedly supply the genes which costrol heredity, as told in the article

Many genes depend upon conditions inside plants and animals or mound them. They one knows that cold or lack of water stants the grout of plants on matter what genes for size they have inherited. Discave makes some pips become runts, though them eithly brother and water pigs develop into bug fat animals. A defect inherited by both nuce and human length cases caused the planting plant do to top protocome grounds the plants of the protocome and plants. The plants of the protocome an implies to pixel or plants of the mouse on man becomes a might in option of the grounds.

Heredity in Human Beings
Human beings have many thousands of genes in 24
pairs of chromosomes. Many of the genes give simple
Menclelan heredity. Some examples follow

SIMPLE MENDELIAN TRAITS IN MAN

Ordinary
Curly I our
Dark hour
Tanning of skin
Brown eyes
Prom nent (1)n
Heating hed ear lobes

Straight hair Blond hair Lack of lanning Blue eves Ordinary clun Attached ser lobes

Septimied

Normal color vi ion

Clotting of blood

or vi ion Common color blindness blood Nonclotting or bleeding"

Continuing genera delte name sex, for two X chromes promise a grift bly white an A sund a Y made a boy. That's other than sex are also controlled by these chromosomes and since these that spow the these thouseous and since these that spow the controlled by these chromosomes and since these that spow the the sex heretage they are called acc-halated. The Y chromosome is no small that it could use few general sex but the X contains genes for sex-lanked characters such as hallness and common color blandess.

The small sare of the human Y chromosome explains why recessive see linked characters appear in me more often than they do in women I to the case of many such traits a man gets only one goes, in-tead of two, in each pur If the gene happens to be recessive, that character will appear, for these cannot be a

dominant gene to mask it. Women, however, must receive two recessive genes before the recessive trait can develop.

Many defects and diseases also are hereditary. Defects range from inability to tan, which causes sunburn, to drooping eyelids, cataract, weakness or partial destruction of muscles, and paralysis. Among the hereditary diseases are two kinds of anemia, allergy, diabetes, and several types of cancer. A tendency to be affected by other types of cancer, or susceptibility to them, also seems to be inherited.

Hereditary cataract of the eye, which may lead to blindness, is caused by dominant genes; but their action may be prevented by other genes or by conditions in the hody. Inheritance of haldness is even more complicated. The sex-linked factor in haldness depends upon hormones produced hy glands; but the pattern of baldness seems to be controlled by another group of genes. These have no effect at all when baldness genes or hormones are missing.

Fceble-mindedness and four types of idiocy prove that mental characters can be inherited. It is much harder to show that good mental qualities also are hereditary. And yet in some families talent and high intelligence have "run" for several generations and even for centuries. This suggests that genes may determine good mental qualities as well as poor ones, though training, good health, and other factors also play their part.

## How Genes and Characters Change

Although apparent suppression and reappearance of many traits can be explained by dominant and recessive genes, plants and animals occasionally show entirely new characteristics, not present anywhere among the ancestors. Such changes in heredity are called *mutations*. There are three general types:

1. Chromosome mutations involve changes in the number of chromosomes. Sometimes one or two are lost; sometimes they are duplicated. In sexual reproduction each new organism should have twice the normal, or haploid, number of chromosomes found in reproductive cells, and therefore is diploid. But one reproductive cell may keep all its original chromosomes; when it combines with another that is normal, the new cell receives three times the haploid number of chromosomes, or is triploid. Cells may also receive two full (diploid) sets of chromosomes, and therefore are tetraploid.

2. A class of mutations that has no accepted name is caused by changes in the number or arrangement of genes inside chromosomes. Pairs of chromosomes often twist and exchange sections, so that genes which started out in one, end up in the other. This is called crossing over. Genes may also be lost or duplicated, or sections of chromosomes may be reversed, placing genes in the opposite of their normal order.

3. Gene mutations come from changes in the structure or materials of genes. Each gene seems to be a complex protein molecule containing thousands upon thousands of atoms, all arranged on a particular plan. Any change is almost sure to modify the character

the gene produces in a growing organism. This modification then is passed on to later generations.

Gene mutations have heen produced by heat, cold, chemicals, X-rays, and other forms of radiation, including rays from atom bombs. No one knows just how the first three act, but radiation apparently disturbs the balance of atoms inside genes, thus producing mutations. Radiation also breaks living material into electrically charged particles called ions which may recombine in new arrangements or may wander into molecules such as genes. There they have almost the same effect as radiation itself.

Many mutations that appear in experiments with plants, animals, and monerans are harmful, but others are valuable. The same is true of mutations that appear in wild organisms. Most biologists therefore believe that mutations have provided the countless hereditary characters that have led to evolution (860 Evolution). The process of natural selection, as set forth by Darwin, eliminates harmful mutations and preserves advantageous ones. (This theory is commonly known as "the survival of the fittest.")

The causes of natural mutations also may resemble those in experiments. Some natural mutations seem to have been caused by heat and great cold. Others probably are produced by cosmic rays that come to our earth from other parts of the universe. Some experts believe that all the natural mutations now occurring in man are caused by cosmic radiation.

HER'MES. "A schemer subtle beyond all belief" was the Greek god Hermes, also called Mercurius (Mercury) by the Romans. He was the son of Zeus and Maia, daughter of Atlas. He began his career by escaping from his cradle, when a few hours old. and going out in search of adventures. Finding a tortoise, he took the shell and stretched cords across it, thus inventing the lyre. That same evening he stole the oxen of Apollo, god of the sun, hid them in a cave, and killed two of the oxen. When Apollo discovered the theft, Hermes charmed him by playing on the lyre, and Apollo allowed the little rogue to go unpunished. Hermes gave his lyre to Apollo and received in return a magic wand, called the caduceus, which bestowed wealth and prosperity and turned everything it touched into gold.

Hermes was made the messenger of the gods, and one of his many duties was to conduct the shades of the dead to the lower world. Among men he became the patron of merchants, the god of eloquence, of good fortune, of prudence and cunning, of fraud and theft. He was also regarded as the god of the roads and the protector of travelers. Pillars with his image at the top were erected as guideposts.

Hermes was represented most commonly as a slender youth, wearing a broad-hrimmed hat adorned with two small wings, and carrying the caduceus in his hand. On his sandals were wings that bore him over land and sea with the swiftness of the wind. Of the statues that have come down from antiquity, the most famous is one thought to be by Praxiteles. It represents Hermes carrying the infant Dionysus.

The special

HERO AND LEANDER The imperishable story of Hero priestess of Aphrodite and Leander the stalwart lover who nightly swam the Hellespont to meet her, stands in literature as one of the supreme exam ples of all fated love. According to the story as told by various Greek and Roman poets (notably Musaeus) Hero used to place a lamp at the top of her lonely tower at Sestos each night to gui le her lover Ven turing from Abydos one stormy mucht be was dr wied and his body was washed up I the shore been g his lifeless form. Hero plun, d into the water that

she might ion him in death The English poet Byron who himself swam the Hellespont refers to the tale in the well known lines

The winds are bigh on Helle s wave As on that night

of stormy water When love who sent fergot to save The young the beaut ful

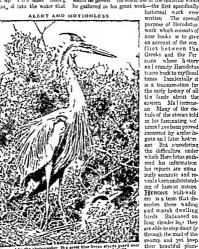
the brave The lonely hope of Sestor daughter

HEROD The Herod family began its reign with Herod the Great. who was appointed king of Judes by the Roman Senate in 40 mc On his death in 4 B C , his son Hero i Antipas was made rul er of Gahlee It was to him that Jesus was sent by Pontius Pilate Herod Antinas cast

aside his first wife to marry the wafe of his brother When John the Baptist denounced this marriage Herod had him thrown into prison. On Herod s birthday his stepdaughter Salome danced before him and his guests and pleased hm so much that he told her she mucht ask

for anything she wished -even to the half of his king dom. The girl went to her mother and said What shall I ask? Her mother replied The head of John the Baptist 'So Salome returned to the king and said, 'Give me here John the Baptist a head in a charg er" (a large plate) Herod numediately gave the order for the evecution and the head was brought to her Several operas have been based on this story, which has also been a favorite subject with painters

HEROO OTUS (about 484-425 B C ) The Father of History as Herodotus is called was born at Halicarmassus, a Greek colony on the shores of Asia Minor He early devoted himself to a literary life and traveled extensively visiting the shores of the Hellespont and the Black Sea (Eurone) as well as Scythia Syria, Palestine Babylon Egypt and the northern part of Africa He investigated both the customs and rel gion of the peoples and the h story of the countries through which he passed He made use of the material which he gathered in his great work-the first specifically historical work ever

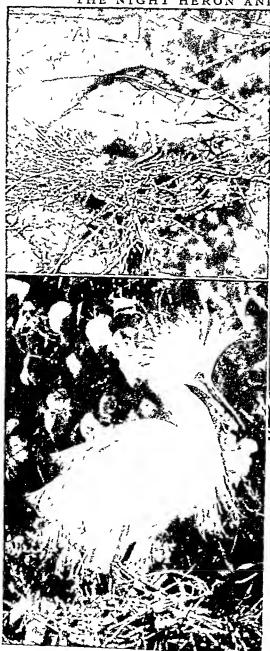


purpose of Herodotus work which consists of nine books is to ene an account of the con fligt between the Greeks and the Per suns whose hetory an I enmity Herodotus traces back to mythical times Incidentally it is a treasure-store for the early history of all tle lands about the eastern Me | terranean Many of the details of the stories told in his fascinating vol umes have been proved incorrect by archeclogists an I later histori ans But considering the difficulties under which Hero fotus gathered his information his reports are amaz ingly accurate and resealakeen understanding of human nature HERONS Stilt-walk ers is a term that de-

age immaculate arestocrats of the family are the levely egrets Herons may be found in virtually all parts of North America except the arctic regions They range in size from the small green beron to the great blue and the great white herons Egrets are now rare since they were shaughtered extensively for their beautiful plumes The herons and egrets live on the shores of salt-

water lagoons fresh water lakes and rivers Although solitary in their feeding habits, they nest

# THE NIGHT HERON AND ITS SHOWY RELATIVES



and roost in flocks. A hundred or more birds often frequent a single nesting site, or heronry. Their nests are crude platforms of sticks placed usually in trees. The eggs number 3 to 6, and are white or bluish-green. The young are born covered with down and are reared in the nest. Unlike cranes, with which they are often confused, herons and egrets fly with necks curved back so the head lies between the shoulders.



The black-crowned night beron (upper left) wears a plain cost of black and white. But its male cousins, the American eget (upper right) and the snowy egret (lower left), display eignn's plumes during the breeding season.

They have thin bodies and necks, straight namer beaks, and large blunt wings. During the breeding season most herons and all egrets have elongated plumes growing from the head, neck, back, and breat.

Herons and egrets belong to the family Ardeidse, which includes also the bitterns (see Bitterns).

## The Herons of America

The great blue heron (Ardea herodias) ranges throughout the United States. It is about 45 inches long. Its plumage is slaty blue on the back, wing-coverts, and tail, with streaked black-and-white underparts. A long black crest grows from the back of the head. (For illustration in colors, see Birds). This bird is a skillful fisherman. It stands statishke in the water, until its keen eyes discover a fight swimming by. Then, at exactly the right instant, with one sudden stroke of the bill the bird seizes its prey. Sometimes it stalks slowly through the shallow water, lifting each foot clear and setting it down again so gently that no ripple warns the fish or frog.

The green heron (Bulorides rirescens) is common in the eastern United States. A sub-species. Anthony's green heron, lives on the Pacific coast. This bird is only 18 mehes long. It has a blick eroun reddish brown neck, green back and wings and gravish under parts with dark streaks. Unlike most berons it is a solitary bird. It has a curious trick of freezing When it is startled it will fly to a perch and become absolutely rigid, with head and acck pointing skyw ir l in line with the body. This posture combined with the streaked breast and dark back enables the bird to blend into the foliage and escape detection

The great white heron (Ardea occidentalis) 48 to 54 inches long, has pure white plumage. It frequents southern Florida and the Florida Keys where it nests

in the mangrove swamps

The black growned night heron (A yetu arax myeta corar) one of the commonest of herons breets throughout the United States It is two feet long. The crown and upper back are black the lower back wings and tail ashy gray Less common is the yellow crowned might beron (Auctionasia molarea) which has a more southerly range. The lettle blue heron

(Florida caerulea) and the Louisiana heron (Hydranassa tricolar) are common in the southern states from North Carolina to centrat Texas

The Lovely Egret The most beautiful birds of the heron family are the egrets represented in the United States by three apecies The American egret (Carmerodius albus) 15 a white bird 41 inches long not to be confused with the larger great white heron It breeds in Oregon and Califor nia and from central Illinois an I New Jersey

southward. During the nesting season it wears a magnificent train of about 50 straight 'augrette plumes that grow from between the shoulder blades and reach beyond the tail Even more gorgeous is the nuptial dress of the smaller snowy egret (Fgretta thula), which breeds along the coast from North Carolina to Louisiana and Texas. The rare reddish egret (Dichromanassa rufescens) breeds along the Gulf coast

To the egrets beauty proved a curse for women wanted their distinctive feathers for adornment The plumes develop early in the season. But since the kill ing of one bird then might rout the entire colony the plume hunters waited until the eggs were hatched Then the adult birds were slaughtered leaving the fledglings to starve These levely birds once found by the tens of thousands, were almost exterminated Thanks to the Audubon societies, which obtained and enforced protective laws, they are again on the increase

HERRING Economically the lerring family (Cluperda ) is the most important of all the families of fishes In a list on to the rommon berung it includes the el 11 aleume pulchard sardine and menhaden (see Menufe Palebard)

He common herring (Clapea harenous) is of immener value as a food fish. It is used fresh canned smaked or calted A favorite preparation is the parth smoked form of bloaters Great quantitie of young lerring are canned and sold as sudines

Herung are found in incredible numbers in the North Sea the north Atlantic and the seas north of 4-11 They sa m in closely packed sel only often cov ening are is of from 6 to 20 square miles. In the United States the cluef fisher es are off the coasts of Maine and Alaska. The Manne catch is used largely in the canning of surdines. Most of the Alaskan catch is manufacture I into fish meal and oil. The meal is fed to poultry same and other animals. The cil is use i in the manufacture of many industrial products

HESSIAN FLY Tiny though it is-about one-eighth of an inch long-this insect pest does more damage to the grain field than any other Its larvae or young suck the sap out of the tender shoots of wheat rye and barley The damage to wheat alone has reached at least \$100 000 000 in one year in the United States There have been many widespread invasions, and local outbreaks of the pest

damage amounts to

many millions of dollars

THE MOST FAMOUS OF FOOD FISHES occur nearly every year The average annual

The is the common herring of the toot long some specimene may reach e length of 18 m female depos to more than 30 000 eggs such season feeds on ses plants and small sminet bie

The Hessian fly has long legs long feathery anten-

nae, and oval harry wings. It belongs to the gall guat family (Cecidemyridae), including also the resin gnat the wheat midge, and the pear nudge A femule Hessian fly deposits from 100 to 150 eggs, hardly one fiftieth of an inch long in the grooves on the upper aides of young wheat leaves. The pale red larvae or maggets hatch out in about five days, move down into the leaf sheath and there suck the purces from the plant s stem Before they grow into adult flies they mass through the pupal stage in which they resemble and are called, flavseeds to remedy for this pest is known Preventive measures include late sowing after the insects have died crop rotation and plow mg under of all infected stubble

The Hesuan fly gets its name from the common behef that it was brought into America by the Hessian troops during the War of the Revolution Scientific name Phytophaga destructor

# HIBERNATING to LIVE through Winter COLD

HIBERNATION. Before northern winters begin, many birds travel south to warmer climates Some four-footed animals go southward too, but hardy creatures such as rabbits and foves stay where they are and live as actively as they do in summertime

Many animals, however, neither travel southward nor remain active. Instead, they hide in sheltered

A WOODCHUCK LIES

places and become so quiet that they often seem to be dead. Though we sometimes say they "go to sleep" for the winter, they really hibernate.

Different animals hibernate in different ways. Many insects do so as larvae or grubs which hide under dead leaves, lie in rotting wood, or burrow into the ground. Most caterpillars (young butterflies and moths) turn into hard-shelled chrysalids or pupae. Often they lie covered

by silky cocoons which they spin. Mourning cloak butterflies, however, spend the winter as full-grown insects. They hide among logs, under leaves, or in cracks covered by loose bark. On warm winter days the butterflies often crawl out and flutter about in the sunshine. Ladybird beetles also come out on warm days, but they do not hide alone as butterflies do. Instead, they gather in swarms that number bundreds or even thousands.

Most fresh-water fish remain active all winter, though carp and bass become sluggish and probably do not eat. In the sea, certain flounders and the widemoutbed toadfish wriggle into the mud and hibernate under shallow inlets and bays

American toads push their way down into the ground. Tree frogs hide in hollow trees, but adult green frogs sprawl out under stones in ponds and streams. Their tadpoles lie in soft mud.

Snakes find shelter in holes and rocky dens. These may be near the surface or as much as 15 feet deep. If these holes or dens are large enough, dozens or even bundreds of snakes may gather and spend the winter in tangled balls

Box turtles burrow into soft ground, while painted turtles dig burrows in the banks of streams. Mud turtles and others bury themselves in mud on the bottoms of ponds. There they he without breathing for as much as four months at a time.

Before migration was understood, people thought birds hibernated in caves or under water. After migration was discovered, no birds were thought to hi

bernate. But in 1946 birds related to whippoorwills were found, apparently hibernating, on a mountain in southern California. There are signs that other hirds may become sluggish or even dormant in winter.

Woodchucks are the best-known hibernators among mammals They are the "ground logs" which are said to come out of their burrows February 2, but go hack

SNUGLY IN ITS DEN

for six more weeks of winter if they see their shadows Actually, woodchucks go into burrows four or five feet underground

Bears are not nearly such perfect hibernators. In the Southern states, such as Florida, bears are active all through the year

in September or October. There they stay without moving till the middle or end of March. Ground squirrels, jumping mice, and some bats also hibernate for four to seven months The woodchuck lengthens the tunnel of its summer home and hibernates in the chamber at the end of the tunnel, several feet under ground.

In the North, black bears "den up" when winter comes, but when the cubs are born, their mothers care for them and nurse them. On warm winter days the male bears often wander about. Red squirrels, chipmunks, and skunks do the same, and badgers as far south as Iowa "den up" during only the coldest weather.

Hibernation Differs from Sleep

Such animals never become dormant, and they seem to spend much of their time dozing or in sleep. This is very different, of course, from dormant hibernation Sleeping animals relax, but their way of hving does not change. True hibernators, bowever, almost stop living Many insects, spiders, and snails are frozen solid; some frogs and northern fish are partly frozen Woodchucks become cooler and cooler, till their bodies are only a little warmer than the air in their burrows. The animals also breathe very slowly, while the beating of their hearts both slows down and becomes irregular. The same changes take place in hibernating ground squirrels and mice.

In spite of these changes, hibernating mammals are protected against freezing. If the weather becomes dangerously cold they "awaken," move about, and raise the temperatures of their bodies. Any that fail to do this freeze to death.

Chipmunks take food into their burrows and eat it when they are active on warm winter days. Almost all animals unconsciously prepare for hibernation by eating large amounts of food during summer and storing it in thick layers of fat. Woodchucks, ground squirrels, and bears eat so much before hibernation

that the r bodies become very plump Even turtles snakes and frogs accumulate fat which provides energy for hie during the months

when they do not eat
Animals inherit the tend
ency to hibernate just as
they inherit their shape
color and other character
ist ca. But this tendency
must be helped by other fac
tors such as cold fatness

or hunger and darkness
Cold is the most important factor encouraging hibernation Ground squirrels snakes insects and other an mals become slug-

gest as soon as the weather grows chilly and as it turns colder they become dor neart. Skunks ch promaks and badgers also take to their burrows as autumn, eather turns cold

Hunger and fatness affect different animals Bats hierance a len food becomes score though, wood shucks reture to the r burrows while it is plential Mountain marinot sile called sifficurs or whistiers hierants during the first autumn sonostom at they have thick coats of fat Othersee they come out after the storm and keep on esting. Ground squarred that fatten on screps and gifts of food from townsis he bernate two to four weeks earber than others that are not so well fed. The fattest as multi-remain dor

mant longest—a fact that also is true of bate
Darkness and quet are very important Most ani
mals hermate in dark places and when the time
HOW EARTHWORMS AND TOADS SPEND THE



mourning e oak but e fly spends the winter as a fully grown insect. It has in shelter unde logs, leaven, or cose bank disting on d weather, but it comes out on warm sunny days.

comes for them to do so they try to get away from I ght. Even m eets that normally fly or mant ton ar! bright I ght seem to be attracted by dark cracks and corners when autumn comes. Animals that habernate in burrows or dens always

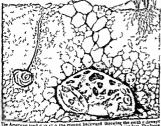
are abstrated from no a. It sendore no see of sturbs, here many ground say trees not woodchucks. In 2006 which are no sy as well as light many animals that normally hishernate remn ne time drive during the winter. Act alone (or estration) differs from a bernative state as large and spring are the times of plential food water and conductable temperatures Summers and spring are the times of plential food water and conductable temperatures Summers are dry and very hot and food often become avery source. Cern a desert cross all sources; therefore take to

their burrows in June or July and remain there
winter
of the southwestern United States both
liberates and accurates

HICKORY The most typ cally American trees are the hickores particularly the shaghark. From the hard tough a cod of this tree the poneers fashnored as handles nagon shafts wag on wheels and many other useful thangs. They burned it im stoves and smoked hams and he on with it. Every fall they barvested the heavy muts.

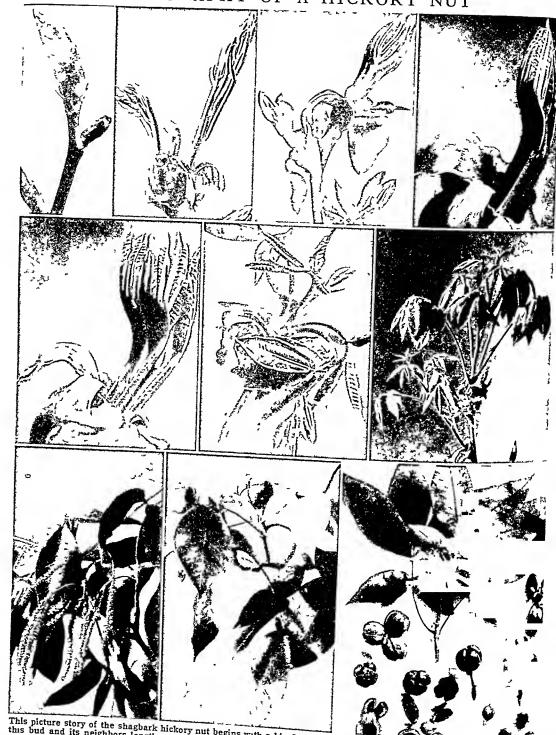
To this day the shagbark and certain often hadonies serve these same pur potes Io add tool lawn furniture skis ladder rungs gymnastic bars pump rode and picker sticks for rotton milis are also made of hickory wood

For many of these things secondgro th heckory is preferred. This is the mod of trees that have spring up where old linkbury groves were cut down. With no large neighbors to compete with them for similght and water the pea hickory trees springs.



The American toad d gs in o the ground backward threating the certain with the bind feel and wedging the body downward with the fort feet. If each this back into the ho e as soon as the toad has we ked shelf in N load S an earthworm coded at the bottom of its bursew

# BIOGRAPHY OF A HICKORY NUT



This picture story of the shagbark hickory nut begins with a big firm bud (upper left). In the next six pictures we see how this bud and its neighbors lengthen and swell until at last they open out into long slender leaves. Then appear long spikes of tiny flowers (lower left). Next we see the climax of these events—the hickory nut growing on the tree and westing a thick husk with four deep seams. The last picture shows us the ripened fruit and the way the husks fall off in autumn, exposing the hard nut inside. Similar to this in development is the much larger nut of the shellbark lickory.

g ows a company w

ad si aci vefer

either from seeds or from old stumps, develop hear, or and stronger wood than that of old growth bucker es

The Shagbark and Its Relatives The shagbark (Carya ovata) grows in every state in the eastern half of the Union It prefers rich bottomlands but is found elso on low hills. It grows very slowly At the age of 5 it is only about 17

inches tall at 30, only 20 to 30 feet tall and 3 to 4 inches in diameter. When 200 to 300 years old it may be 80 to 100 feet tall and 2 to 3 feet in diameter Trees more than 350 years old and 4 feet across have been found Seasoned shag bark wood weight as much as 55 pour li a cubic foot White oak and black locust, the next heaviest woods of the United States weigh only about 50 pounds a cubic foot

Three other hickories are also impor tant for their wood The shellbark hick ory (Carya laciniosa) closely resem bles the shagbark but has larger nute and leaves It grows on most bottom Linds of the Ohio and M sessippi River valleys The pignut hickory (Carya glabra), a somewhat emaller tree grows on uplands in most etates east of the M ss suppi River Under favorable con ditions, it may grow wood that is even leaver and harder than that of the shagbark The nute are thin-shelled but often so bitter they are left for jugs to eat. Its bark is dark gray and narrowly ridged The mockernut hicknry (Carya tomentosa), commonly found on hills and bottomlands of the South com pares with the charbark in wood and in size but the ridges of its bark are rounded instead of shaggy The nut

ingly small kernel (hence the name mockernut) Hickories belong to the genus Carya or Hicoria of All the thirty the walnut family (Juglandaceae) or more species are natives of the eastern Unite l tates and Canada except three which are foun I in Merico China and Indo China respectively Those in the United States are classified either as tre bickories valued chiefly for their wood or as pe an buckeries valued chiefly for their nits (see Pecan) HIEROGLYPHICS The name comes from two Greek words meaning sacred and carving It wis u ed by Greek and Lat n writers to describe the sacred char acters of the ancient Egyptian language It is now apphed to other systems of writing such as the old Chi nese in which symbolic figures of objects are used to convey meanings instead of using alphabetic letters to spell out the sounds of words (see Wnt ng)

almost round has a very thick shell and a disappoint-

HILL JAMES JEROME (1838-1916) The career of James J Holl emp re bu l ler an I financier was I ased on one great idea—that of creating a railr a i sy tem through the undeveloped Northwest Born near Guelph Ontano of Scott sh Irish parents he had early decided to become a doctor This plan had to be discarded however when an accidentally discharged arrow cost him the sight of one eye

At 18 he arrived at the frontier village of St Paul Minn and took whatever work he could get He was at various times shipping clerk railroad station agent and trader. He traveled the wil-

derness by oxcart or horseback and with dog sledges. He grasped its agricultural po bilities and learned something of the m neral wealth of the Lake Super or remon He kne v that a railroad through that territory could be a success Hill's chance came in 1878

three ther men he formed a syn licate which purchased the St Paul and Pacific Rail ad The roal had never male any profits and though it had a valuable right of way leading to the Northwest little construction work hal been done

In just to years Hill had not only turne I failure into succes but had absorbed many otler rail lines into one c roorste system Between the years 1891 and 1906 a mile of railrox I was la d and equipped for every working day of that period And all the was accounpl shed without government assistance although nearly every other western ra lroad at this time received public land grants In the meantime Hill develope I steamship lines on the Great I. Les and the Lacific coat and made them a part of what we now call the

The chechork commonly ( reat Northern eystem He dd not at back to wat for the Northwest to become prospersus he

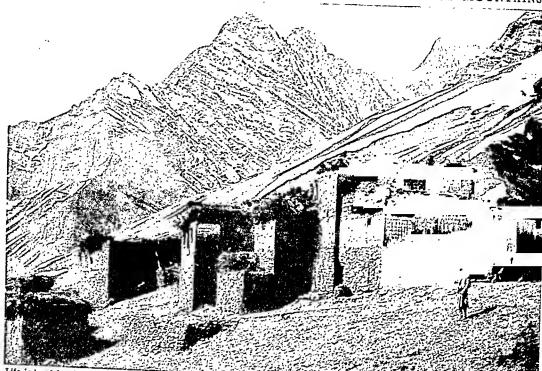
made it prosperous by encouraging homeseekers to settle in the new territory and assisting them on the road to prosperity Datributing blooded bulls free to farmers was typical of his metho la In later years Hills sound and practical judgment

HIMALAYAS (II mala yaz) Tie Himslayas do not form an extensive mount in evetern. The length of 1 of 0 miles is but I tile longer than the Appalachians and the width is no greater than that of the Andes on Chile But in elevation this system ranks first Dom the southern of its to parallel ranges, between 40 and 50 peaks spring more than 23,000 feet in the ar overlopping all other mountain systems on the earth Mount Extrest the highest of the Hima layas, toners 29 025 feet or about five an I a half miles above sea level The average elevat on of the passes 18 000 feet

on national problems was eagerly sought

Lying on the northern front or of India, the Humalayas extend from the great hend of the Indus. separate the platrau of Tibet from the pluns of the Ganges They are located in the subtropic lat tude,

# A VILLAGE ON THE SLOPES OF THE WORLD'S LOFTIEST MOUNTAINS



Life is hard for these hill people who live high up on the bleak wind-swept slopes of the Himalayas. Their stone houses are cold, dark, and smoky, with few windows to let in the cold or snow. They spend much of their time on the flat roofs, where they store their scanty crops and thresh grain. There the women spin and weave, and perform other household duties, when the weather permits.

so the snow line is lifted to 16,000 feet. The lofty southern ranges intercept the heat and moisture from the Indian Ocean. Their southern slopes are drenched with rain—more than 900 inches have fallen in a year at Cherrapunji—while the inner ranges and the Tibetan table-land are cold, dry, and half-desert.

On the southern slopes up to 5,000 feet the tea plant is cultivated. Grains and fruit are grown up to 12,000 feet, and in summer cattle are pastured up to 18,000 feet. Mountain villages are often imperiled by tigers and leopards; and snow blocks the passes from November to May. Innumerable streams and cascades from melting snow and glacier nelds drop through wild gorges to swell the three great rivers of the Indian peninsula. Simla and Darjeeling are fashionable pleasure and health resorts.

Because of the majestic height and inaccessibility of many of the summits, the native peoples have from ancient times reverenced the Himalayas as the home of the gods. Pilgrims still climb to the source of the sacred Ganges for seasons of prayer and penitence. The name Himalaya means, in Sanskrit, "dwelling place of the snow." (See also Everest, Mount.)

HINDENBURG, PAUL VON (1847–1934). Soon after the first World War broke out, a message was rushed by German army headquarters to an obscure German general who had been living unnoticed in Hanover

since his retirement at the age of 64 three years before. He was asked to take command against the Russians, then pouring like a flood over the castern borders.

The old man replied by telegraph, "I am ready," and within two weeks set the world gasping by practically annihilating the invading forces in the battle of Tannenberg in the Masurian Lakes region (see World War. First).

Thus Paul von Beneckendorff und Hindenburg—the names are those of his family estates—in his old age started a second career that was to make lim outstanding in his generation. In August 1916, after the battle of Verdun had failed to win the war for Germany, Hindenburg was given the chief command. Next year he beat off a tremendous Allied drive to "break through" the Western front, by a stubborn defense in new positions generally called "the Hindenburg Line." In 1918 Germany was forced to ask an armistice, and it became Hindenburg's bitter duty to lead his defeated army home. He retired a second time.

But in 1925 the Conservatives of Germany asked the old field marshal, then 78 years old, to be their candidate for president. His sweeping victory caused great apprehension among the former Allies. They knew his devotion to the Hohenzollerns and feared an attempt to restore the monarchy.

Again Hindenburg surprised the world. His oath

of office, be declared, required him to defend and mantain the republic—and so be drd, in spate of personal feelings. He also agreed willingly to all policies designed to reconcile Germany and her former foes, such as the Locamo Part s and entering the League of Nations, until 1933. Then the evident determination of the German people, in despar over their nation of the German people, in despar over their landenburg tillon, to have a dictator, personated Handenburg tillon, to have a dictator, personated Handenburg tillon, to have a dictator, personated Thereafter Hindenburg became variously materia.

HNDUISM The wast majority of the people of India are Hundus The name "Hundusm" is given to the complicated combination of religious bediefs and sensitive invotors which govern them. This system gives up through the slow transformation of very ancest bedief. When the Aryan conquero, but appeared in northern India, about 1800 a c there gradually assess a series of accrete dwitnings in Surkwite called 1500. These spreased a mystical pantherem—a belief that God was in everything, alive or not alive.

The Yedas show us this early Aryan socially the Yedas show us this early Aryan socially are also four excitance—the Brahman's or precity and the Yedas four excitance—the Brahman's or precity are the Yedas and the Sedas or Lock because of the Yedas and the Sedas or Lock because of the Yedas and the Sedas or Lock because which we have a sed as replaced by the He Markan Sedas well as relapson alled Brahmans," which are commentaries on the old Yedas. Gradually, postber and gave may to a religion of personal gods, of the Brahman, the "Tather of all," vishing the "Preserve and Swy, the "Destroyer" were the most important

As the native tribes of India were conjugated on by one by the Aryans, the Brahmans found it were to allow the new converts to return many of their old beliefs and primitive religious customs. Opposition to this adulteration of the old religion was in part responsible for the foundation in the 6th century as of Buddham and Januing see Buddha, India),

but the Brahmans prevailed

Today, Brahmanism has ceased to event as a separate faith, being swamped beneath the mass of pipular beliefs and privals, and later introductions such as Mohammedanum and Christianty Scores of seets have grown up, some emphasizing the wombin of Vishinu, others of Siva, others setting up never roots and goddesses. Most of the sects base their privates upon popular sizered treatizes of comparitively recent origin, celled "purnais". At the same time the old fourfold cate system has sphil into thorsands of branches and sub-castes each with its pecular rites and restrictions.

Most true followers of Hindusin obserte broadly smilar rules regarding food, marrage, and bunal. They do not eat mest because they think it wrong to take life human or animal. One of the most interesting of the Hindu beliefs as the transmigration of souls, or "metempsychous". According to this doctrine the coul of a person passes at death into some other

creature, ether human or annual. If the person has led a good they, the soal goes upward in the scale—a low-caste, for instance, is reborn as a high-caste, but if the person has led in evil life, the soul may pass into the body of day or a pig or any other annual Everything in min life, say the Hindus, is a consequence of actac high gradual building up of a fame to order of the standard soul the same and the same and

The Hudu gods are supposed to have undergone a series of incarantons or "avaturs" similar to those through which men must pass. Thus the god Krishna is looked upon merely as a form of the god

Vishnu HIPPOPOT'AMUS The features that make a hippopotamus at first sight seem grotesque are in reality extremely useful to the animal in its peculiar method of hie The nostrils, the protruding eyes, and the ears are set on the upper surface of the flat face so that they alone project above water when the hippo' awims, leaving the great head concealed. The enormous scoop-shovel' mouth is suited to gathering in plants from the bottom of lakes and streams. The amouth barrel-shaped body is well fitted for under water travel The name hippopotamus means river horse,' but this African animal is really related to the pigs The hippopotamus shares honors with the rhinoceres as the largest land mammal next to the elephant Adults commonly measure 12 to 14 feet in length and 5 fect or more in height at the shoulder Large speci-mens may weigh as much as 4 tons. The body is covered with a hide 134 inches thick on its back and aides, and hairless except at the tip of the tail. Its huge red mouth is furnished with large teeth-tucks in the lower naw. It can close its large nostrils and

short ears when under water During the day the hippopotamus remains in the water, often in herds of 20 to 40 At times it disappears beneath the water for 8 or 10 minutes at a time, spouting and snorting when it comes to the surface When excited or in pain the body is covered with drops of a reddish fluid, which gives rise to the saying that the hippopotamus "sweats blood ', but the blood forms no part of this reddish sweat At night the hippopotamuses (or hippopotami) go to pasture, feeding on water plants and grasses They often journey 8 or 9 miles in search of good pasture and sometimes make inroads on cultivated fields For this reason they have been exterminated in most settled districts The natives also hunt the hippopotamus for its flesh as well as for its teeth, which are superior to avery in hardness. The explorer Sir Samuel Baker says of a wounded hippopotamus which he saw leave the water and gallop savagely mland "I never could have imagined that so un weldy an animal could have exhibited such speed No man could have had a chance of escape"



You really couldn't ask a hippopotamus to cover up his mouth when he yawns. It would take a bale of hay to conceal that cavity. In spite of his fearful looking pair of jaws, the "water horse" is timid and inoffensive unless he is infuriated. With those long tusks he can root up grass like a steam plow.

Though formerly plentiful in Fgypt the common hippopotamus (Hippopotamus amphilia) is near found only in equatorial Africa. Several governments of the region protect the great be ists to prevent their extinction Remains have been found that milk its they once reamed over Europe and India. The ' belsi moths" mentioned in the Bible may have been hippopotami. The huge animals thrive and breed in car tiv

ity. The young weigh about 50 pounds at birth and may be born under water. They can swim before they their of our d

In addition to the common lappopotamus, there is pigmy species (Hippopolamus liberurasis), about 215 test high and 6 feet long. When full grown it weighs only about 400 pounds. This species is found chiefly

## HISTORY'S PAGEANT through the AGES

History To read listory is like visiting strung far-off lands Like timel, it take us out of the narrowness and commontilize of everythy ble unit shows us the wonderful panorama of man in his slow ascent from earliest savagery to modern civilization The stupendous story goes back to the times of the old patnarchs with their flocks and heid the keen eved Greek, the stately Roman, the watching Jouthe uncouth Goth, the hornd Hun the ettled pickers of the unchanging East, the restless shifting of the rapid West the rise of the cold and classical civiliza-

tion, its fall, the rough impetuous Middle Ages, the vague warm picture of our-elves and home In prehistoric times, primitive peoples learned of

their past through legends and myths Scothsavers and priests passed these tiles on by word of mouth Fathers told them to then sons Fanciful and full of supernatural explanations, these stones changed with each telling. Then picture of past events is romandic rather than accurate Our modern knowledge of prehistoric peoples has been gained chiefly from the icmains of their hories and possessions uncovered by archeologists (see Archeology)

Recorded history could not exist until men had invented methods of writing and had developed an accurate calendar to measure the passage of time (see Calendar, Writing) Even then, the early records of ancient civilizations told little about the lives of the people. They were mainly inscriptions on temples

and palaces, designed to glorify the exploits of great rulers Modern history uses all this material, and calls upon astronomy, geology, themsetry, and other errences to help interpret the evidence Using all the findings it tells us how men struggled out of savagery, how nations and laws came into being and why we

find human life organized as it is today. The Birth of History

History, as we think of it now, originated with the ancient Greeks After they had beaten off Persian attempts at conquest, they were unmensely interested in the Persians, the Egyptians, the Babslomans, and even the barbarrans of distant lands In the 5th century BC , Herodotus spent perhaps 17 years traveling and gathering information about these strangers The Athenius were so delighted with his History' that they voted him a reward of ten talents a sum sufficient to make him a wealthy man

Thucydides, the great historian of the Peloponnesun Wars, has been called the first seventific ha-

in I theria and neighboring regions

tourn As an Atheman general, he grasped the sigmak mee of these was He wrote a careful record of events to help people who might face similar probleme later. He was the first to recognize that a study of the past might serve as a guide to the future

He also realized the need to be careful and to consider each side of a question. As an Athenian lie was melined at first to take the Athenian view of the ward between Athens and Sparta. But the Athemans exile I hun, and for many years he studied the was from the Spartan viewpoint. His example taught all later historians that they should use similar care in trying to get at the truth

The Spirit of History

Threvdides is quoted as saying that "history is philosophy teaching by example." Certainly to be lustorically munded' is to see things in relation and in perspective, and to make tolerantly. We must remember I on differently men have thought und acted m different times. We must always keep an open mind ready to receive and weigh new evidence. If we grash this idea, we will never think that a historian is someone who can remember dates That childish idea is like calling a man a state-man because he can remember the names of voters in his districts. A waiter could remember more names and a telephone operator more numbers than the greatest historian.

The true historian is not content to take all his facts from other historians Today he makes suic that his statements are based on sound "documents" or " sources" which go back to the time of the facts themselves Those sources are of all kinds-ruined monuments, old tombs an l other material remains, legal papers, letters, diames, newspapers, and unitien or printed narratives of eyewitheres, even myths and fibles contemporary picture, diamings, photographs, and the like Sometimes the discovery or the finding of the key to new sources-such as the lucroslyphs of ancient Egypt or the cunciform tablets of Babyloma and Assyrra-adds whole new realms to

our historical knowledge

But the historian needs continually to be on his guard not to be misled by his sources A document may be entirely forged Its author may be deliberately lving He may be so prejudiced by national, religious party, or personal bias as to be grossly unfair to the other side. If honest, he may be misinformed as to the facts and mistaken in his inferences. Scores of patfalls must be avoided by the research worker in this freemating field

"In a certain sense all men are his-

torians. Is not every memory written

quite full with Annals, wherein joy and

maurning, conquest and loss manifoldly

alternate; and, with or without phi-

losaphy, the whole fartures af one little

inward Kingdom and all its palitics,

foreign and domestic, stand ineffaceably

recorded. . . . Thus, as we do noth-

ing but enact History, we say little but

recite it: nay rather, in that widest sense,

our whale spiritual life is built thereon.

For, strictly considered, what is all

Knowledge too but recorded Experience.

and a product of History; of which,

therefore, Reasoning and Belief, no less

than Action and Passion are essential

materials?"-Thomas Carlule.

Anyone who reads the accounts published in the different countries concerning the causes and results of wars, or who sees how widely the reports of political affairs in Republican newspapers differ from those in Democratic ones today, will realize that the historian needs caution and training in handling his sources.

"Criticism for good faith and accuracy" has become a special branch of learning. Every trained historian asks, "Did this writer mean to tell the truth?"

And second, "Was he in a position or frame of mind to tell the truth even if he wanted to?" Every statement therefore must be patiently weighed and tested, and combined with all other available information to get at the truth. As a result of such training it has well been said that" by the mechanism now at his command the scientific explorer can read more history from the dust heaps of Abydos than Herodotus, the greatest traveler of antiquity, could gather from the Egyptian priests of Saïs."

Formerly history was regarded chiefly as a branch of literature, and a pleasing style was considered of first importance.

Today the emphasis is placed, as in science and other branches of study, mainly upon accuracy of facts, and the soundness and breadth of the understanding which the historian presents of man's life in the period with which he deals.

History is really a ceaselessly flowing stream, ever widening and deepening its course; but for convenience we divide it into more or less artificial periods. This does no harm if we remember that changes in history, like changes of the seasons, are gradual, and each period passes into the next as imperceptibly as winter into spring, or as life undergoes the slow but constant changes from childhood to youth, manhood, and old age.

To the long period before written records begin when man was taking his first steps in the arts which make up civilization, we give the name Prehistoric Age (see Stone Age). Ancient History covers more than half the span of our recorded knowledge. It stretches from the beginnings of Assyrian and Egyptian inscriptions, through "the glory that was Greece, the grandeur that was Rome," to the coming into the Roman Empire of the Germanic barbarians who overthrew classical civilization (about 3000 B.C. to about 375 A.D.).

The Middle Ages extend from 375 A.D. to about 1500. This period starts with an epoch of confusion and transition which lasts to about 800 A.D.; to it (if anywhere) the term "Dark Age" may be applied.

Then comes the height of the Middle Ages, from Charlemagne to Dante (800 to 1300), when feudalism, monasticism, scholasticism, the Crusades, and Gothic architecture flourished, and a world empire and s world papacy confronted each other and strove for mastery. The period closes with a second epoch of transition (1300 to 1500), which we call the Renaissance (see Renaissance). Since 1500 we have the Modern Period, characterized by the organization into national states, the spread of discovery and

European settlement, the progress of science and inventions, and the rise of democracy.

Written records go back only about 5,000 years. But geologists believe that the earth is at least 1,800,000,000 years old, and men have lived on it for scores or perhaps hundreds of thousands of years. Ta give some idea of the short duration of recorded history compared with this vast expanse of time, Prof. J. H. Robinson asks us to imagine a library of many volumes of a thousand pages each, one page for every 5,000 years that the earth has existed. The whole of recorded history from the earliest Assyrian and Egyptian inscriptions to the

present day would scarcely cover the last page of

that stupendous journal!

If history as a study is often dull and dry, a mere catalog of names and dates of rulers and battles and treaties, it is the fault of the books and not of history itself. Nothing can be more fascinating than the true story of how men and women have lived their lives in the past and in far distant lands—their houses, food and clothing, how they cultivated their fields and manufactured goods and traded with their neighbors, the games their children played and the parents' beliefs about God and the world of Nature, their laws and manner of government, the sangs their poets sang and the beautiful things their artists made. All of this is included in the history which scholars today study and teach.

Even wars and political struggles are interesting when we once know what they were about and how they were carried on, and become well enough acquainted with the heroes and leaders to feel that they were real men and women dealing with things that were of vast importance to their peoples. The great English historian Freeman once wrote that "History is past Politics and Politics present History." But this view is too narrow. Today the historian includes in his survey the whole life of man in the past, as revealed by documents, archeological relics, and all other "sources" which may shed light on the sub-

ject (see World History).

### History Shown in Charts

HISTORICAL charts are to history what maps are to geography They help us to visualize the facts—to fix them in time as maps do in space-and so and both the understanding and memory When the history of the thief countries is shown in parallel columns as here there is the added advantage of synchronizing the events

A glance across these pages will enable one to see what was happening in the different countries in any period Thus a student will quickly find that when the Greeks were best-ging Troy, Samuel was ruling in Israel and Tiglath Pileser I and his armies were conquering to the Mediterranean He will learn that some of the Norman knights who invaded England with William the Conqueror lived to take part in the First Crusade, and that shortly before that the Northmen had discovered Amersca. In the same century that the Purstans were settling Plymouth and Boston there was revolution and cavil war in England Huguenots were persecuted in France, a religious war was fought in Germany and the Dutch won their independence from Spain. This graphic arrange ment of contemporaneous events is valuable in teaching the student to regard history not as a collection of dis connected merdents, but as a series of related movements. each contributing to the story of civilization

## PREHISTORIC PERIOD HISTORIC PERIOD - I. ANCIENT HISTORY

Did Stone Age Boyen Afout 500 000 Years Age Neel this New Stone Age Brane About 6000 B C

8. C.	EGYPT	PALESTINE	BARYLONIA AND ASSYRIA	AEGEAN REGION AND	ITALY
1000	Predynastic period to N in Valley			New Stoor Age In Crale	Kew Stone Age in Italy
3000 l	2100 Begins a of bustorical period with unchasion of country under the first dynasty of k mer	Carrain ton are settled to	3400-240 (about) Sumerian city k ngloma (non Yen i c) Development of canalizam writing	Non-1900 Transition	ļ
	2700-2200 DLD KINDDOM (Dy	Palestice and have many flourshing s tom		from Stone to Brense Age Daws of Europe- es covil sal no in Cress, 2400-1700 Minnes Ass	
	marine III IV) high cultural development cap tal at Marryhla. In Lower Egypt Great Pyrom do at Great County of the		2349-2480 (about) Sets for under dynamy of Sargest of Akkad ruli Butterns.	in Crots hugh ovilsa- tion with capital at Coopers	1
	lendal lords.			2000-1500 3d 6th 5th	2000 Lake dwell
2000	2030-1300 MIDDLE KINDDOM (Dynam en XI XII) capital moved to Thrèse e Upper Espet ainon econarchy and flourabing eu uns 1800-18 U Escenel intermed ain Per- ied (Dynamies XIII XVII) Mys aus rule Egypt (Dynami et XV XVI)		1800 (about) Hammurahl founds first dynasty of Babylon Code of Laws mood Amyra, to the north under Shamshi Adad 1 become in dependent of Babylons	and the pass of Troy  1500-1650 GOLOEN AGE OF CRETE. 1500-1250 7the tyol Troy (Homera ely) 1500-1100 Greatone of Mysenas Tryns sto 1500-1000 Great (Asbassa) colonicalization of	era occupy Itali iao lakes
	1879-1989 NEW KINGDOM (Dy out or KYIN-ZX) The gailed of amplie 1804 1850 Thushose III conquier Falsetine and Syns 1848-1870 Amenholism 1884-1870 Amenholism 1870-1852 Amenholism (Ashanis 1861) free to referre out refer to the de Amenholism (De Amenholism 1870-1852 Amenholism (De Amenholism 1870-1852) Amenho		100-1200 (shout Kasete mmi gratts from Elem gradually ga a power in Babylenia and estab of Kase to heaty (400 Babylenia has well-setablished diplomate and commercial rela- tions who Egyst. 1100 Tulath P user I of Ausyra- compress to the Med terraman.	Greece and minds Dor tan and for an canqueste	
1000	peat hall of Temple at Karnak 1890-980 Dynasiy XXI rules at Taous, and prest kings at Thebes, 950 Beginneng of Dynasiy XXII of Lebyan kongs	Temple After bott- men's draft k raction dry ded mee invest and		1003-400 Greek coloniza ton all Argana minode and Ama M vor extend ed	1000 Erruscans some into Italy (probably from Ann M nor by sea) 1000 Latte vi- lages galab-   shid along T ber
	925 (about) Sheabunk I first king of Libyan dynasty meades Palestins	privada Palest ou		900-100   ad and 'Odys-	
900	Dynasiy XXII continues through	and Eliefts.	ets 890 Ashermacrial II. Percent the empire of Tuglath Pileny I murches to Modificranesis	asy composed (by Ho- mer!) 820 Lyourgue frames have for Speria	
800		Saith of Ka kar Propints Ames and Messa	750-606 ASSYRIAN EMPIRE at to be still.	900-700 Rice of aristan- racios in Greece 776 Traditional date of first record of O ympte games (1et Olympias) 750-650 Sparts conquers	fait) Roma founded,
	730 Dynastics XXIII and XXIV weak and short-lived and with cort- quest of Egypt by Eth oplans begin amg of Dynasty XXV (Eth oplan)		745-727 Bahylarda subjected by Tiglath-Plaser 119 of Amyria. As- syrian rule extended to Egypt.	Messen a begotnes a gelitary power	750 Elensean Bings tavade Laim towns.

# I. ANCIENT HISTORY (Continued)

B.C.	EGYPT	PALESTINE AND SYRIA	BABYLONIA, ASSYRI	A, AND PERSIA	GREECE	ITALY AND
		722. Israel destroyed; peo- ple carried to Assyria.	722-705. Conquests of Sar 722. Conquest of Israel; p	rgon II.	734 (traditional date). Syracuse founded in Sicily.	ROME
		701. Seunacherib invades Judah. Prophet Isalah.	705-631. Sennacherib; gre		708. Tarentum founded in Southern Italy.	
700	671. Assyria conquers		destruction of Babylon.		650-600. Rise of tyrannies	700 Greek crl-
	Egypt. 663. Assyrians plander		681-668. Esarhaddon; Bat 668-626. Ashurbanipal.	oyion reculit	in Ionia; established in Corinth, Mezara, etc.	onies in Sicily and Southern Italy.
	Thebes and withdraw; native Egyptian rulers restored; Dynasty XXVI				630. Cyrene founded in Africa. 621. Code of Laws for Athens issued by Draco.	italj.
	(Saite); revival of power and art.		606-539. CHALDEAN (N	EW BABYLONIAN)	Athens issued by braco.	
		621. Josiah reforms religion of Judah. Prophet Jere- miah.	EMPIRE, 601-551. Nebuchadnezzai and Syria, Hanging Gard	r; wars in Palestine lens of Babylon built.	594-593. Solon, arehon of Athens, reforms Athe-	
600		Prophets Haggal and Zech-	556. Capture of Jerusale		nian constitution. 560-527. Pisistratus tyrant of Athens.	
		ariah.	Babylon. 516. Cyrus the Great defe Lydia; captures Sardis.			
	525. Persia conquers Egypt		539. Babylon taken by C comes Persian province.		<ol> <li>Hipparchus, son of Pisistratus, slain by Har- modius and Aristogiton;</li> </ol>	510 (traditional
	and makes it a Persian province.		539-330. MEOO-PERSIA 525. Cambyses II conquer 522-156. Darius I rules fro	s Egypt. m Accent and Egypt	his brother Hippias ex- pelled, 510.	date). Kings (Etruscans!) expelled from
500			to India; advances to Da ans (513).	inude against Scythi-	509. Reforms of Clisthenes at Athens.	Rome; repub- lic founded.
1000			499. Revolt of Greeks in	Domin	eeks of Asia Minor against	494. Struggle between Pa-
			Asia Minor; two expedi- tions against Greece (492, 490).	tion into Thrace	ars. Darius sends expedi- and Macedonia (493); at- trathon, 490); Xer. es in-	tricians and Plebelans tribunes co-
			486-465. Xerxes. Great expedition against Greece (480).	480. Plataea, 479). 478. An Athenian E	moire founded by Confed-	eted.
		444. Nehemiah returns to Jerusalem and rebuilds	Internal decay of Persian Empire; frequent revolts of Egypt, etc.	i erace of Ilalos as	inet Possinnes Athene 2001	450. Roman laws made
		city and temple. Prophet Malachi.		Athenian culture. Euripides, Aristoj cydides, Phidias,	ival leagues.  PERICLES, height of (Aschylus, Sophocles, thanes, Herodotus, Thu-Ictinus, Socrates, 7eno.)  Parthenon built.	public (12 ta-
	401. Egyptians revolt and throw of Persian rule.		401. Unsuccessful revolt of Cyrus the Younger against	nian end Spartan	alliances; Athenian expedi-	
	thow on retain the.		his brother, Artaxerxes II; retreat of Xenophon and the 10,000 Greeks.	Spartans besiege A fleet destroyed at render of Athens.	nusuccessful (415-413); thens (413-404); Athenian Aegospotami (405); sur-	
400		207 5		399. Socrates put to	death in Athens.	395. Romans take Vel. ali;
		397. Erra returns to Jeru- salem.				er 10 years siege; end danger from
				379-352. War bets	reen Sparta and Thebes euctra (371); leadership	Etruscam.
			362-335. Artaxerxes III king of Persia: in 346 suppresses with great	passes to Thebans.	i	of the Allia).
	341. Egyptian independ-		chief city of Phoenicia.	359-336. Rise of I Philip (power of 7 rones, 338). M	Athens' allies destroys flacedon to power under hebes destroyed at Chae- acedonian supremacy in	to equalize
	ence ends with new Persian conquest of Egypt by Artaxerzes III.			336–323. Alexander ti Great. Invades As	10 343-341. First war ag	and Pleasans
				and founds Gre (Hellenistie) paw of far-reaching in fluence.	er Rome). n- 340-335. Revolt of Latin	
	334. Alexander attacks Per	MACEDONIA sian Empire (Battle of the Gr	N EMPIRE anicus, 334; of Issus, 333; of		League dissolved.	
	332. Alexander conquers E	gent from Powis and found a		Ardela, 331).	326-304. Second Earnite army defeated in the	Caudine Forks
	323-276. Wars among the	fleeing after Arbela; end of P successors of Alexander (Diag	ersian Empire. lochi), who divide the Macedo	onian Empire.	army defeated in the and sent "under the Victories of Romans".  Lake (310) and Bovis the war.	A War married
	EGYPT 323-30 B.C. Ptolemie:	PALESTINE 323-276. Ptolemies mile	SVPIA AND ADDITION	GREECE	Rome becomes the dom	inant power of ableon River.
	Alexander's generals) rule Egypt: great library a	Palestine.	312-251 5-1	323-146. Macedon and Greece und Demetrius Polic	er i	
	Alexandria.		one of Alexander's gen- erals, rules from Syria to the Indes this descen-	cetes and his d secondants. 323-322. Greek state	-	
·	·	<del>'</del>	dants called Seleucids).	fail in revolt again.  Macedonians.	it	

### I. ANCIENT HISTORY (Concluded) PALESTINE SYRIA AND ASSYRIA

8. C.	EGYPT	PALESTINE	SYPIA AND ASSYRIA	GREECE	Ros	M E
300	285-247 Ptolomy II (Philadelphian) bril hant court et Alex andran Exypt seavy roles eastern Medi- terranean.	276 Actiochie af Syma compare Pal- estose from Egypt.	259 Parthines under Araous secolt. 223-167 Arthicolus the Greek defeat- ed by Romans at Mapshara (190) Sciencel rule cu- tailed to wat	200-183 Actalian and Achaem Leagues prevent Manadone wouring complete power in Oracce.	283-272 War with Teterity of Epirus of Epirus 284-241 First War with Cer becomes a navel power; and delected Carthage in Rome gains Sixtly 288-202. Second War with vados Italy over the A Canasa (218 Sep a co (704) and defends Hacu, thage becomes a varied in 285-2018 First Macreton to	thage (over Souly) Rot myades Africa and Sice numerous battles at a Carthage Hannihal; lips defeats Romans must be war into Africal at June 1992 (2)
200	De.lise of Egypt fre- quest war of Ptai amins with the Se- isucide of Nyr s	f67 130 Mancebons fingel role Pake- tins as Remas vec- sels.	[24-126, M cheichiru i Jaunda, Pauluhia Eugler (Cichia, 2er na Buhylatin etc.	sina by Somans and Greece freed from Mandelstan fell Achess Leaguede- fetted by Romera and Corpath de stroyed Greece passes under Roman mile. 133 L.J. T bersen and stroyed and stroyed.	209-197 Second Macedique 599 Antilochus of Syria or Misser socier Roman coute Til 165 Third Macedonias menarrhy 148-165 Third War with 470-165 Third War with 148-165 Third War with 149 Manadania becomes a 1 130 Frantizally off Spain or Calus Granzhus attempt to 1 wiones (Germana survadors) di	certhium) (western, As ol) War and of Macadoni Corthage Carthage d Roman province, der Roman rufs, volorza the land laws on
1210	Cell wars smoog de- generate Finicar et pave way for fall  47 Cinspettra made ruice of Exppt under Roman supremary II Cinspettra and Antomy defeated of Action Ergat benoms Roman presince.	53 Pompsy mokes Jess tributary to Rome.  60 Hered (the Great) executed by Rose as desendant kind of ludies.  4 Sirth of Christ.	85-AE, Milpheldeten VI (the Greet de Seclal by Banan Syris and Armenia subm t so Rame	Boshouary regs of 27-77 Revol of global 64-62 Castiller a costs of Caster Centry at 55-51 Caster scotton 69-68 Cell our habet slam). Under forms of American of Caster Cas	resided to all Latins and most in Security New 160-bill on the Security Security Security core and share under Spatiaco or sed shares under Spatiaco or Security Security Security Chauca Security Security Chauca Security Security Chauca Security Security Chauca Security Chauca Security Se	a.  te sin (SS-56 a c )  to of Pharablus Pompe power into his own hand there adus form second Tri
Tive   Index Roman rule & Judaya becomes   Expt tuppe   part of Roman from from of Judaya and forumers   property   Prope				Held? Tenles expert (Heyes al Angula) 7-41 Cup (In (mark-misson & Angula) 1-4-4 Cup (In (mark-misson & Angula) 1-4-4 Cup (In (mark-misson & Henne Emolis 1-4		
100	Revolt of nailers troops begins dealing of Egypt.	133-135 Ravelt of Jews approved by Radrag survivers dispursed	116-110 Avmunite Mempetama and Amyring state Re- mont presisted.  113-211 Northernho- syrta conquered by Rome	III 138 Hedden ndejtid by Thana freebers strengthend Ask nest Entertor give to marchinest business.  Bi-link fatoms Amriba, adopted one of fairs one and a tree-ward fit glocomple. The desired by the strength of the control of the c		
200			10 70 10	222 All freemes in the	Empire made eltieves (to gal e	sore faxes)
	270 Egypt occup ed by Zenobus of Fai- myrs  173 Egypt recon quered by Rome.		205."41 New Parties Empre under Sec- sanids 147.272 Zanable quem of Palupre defeated by Au c hos.	gerfier'ures greet pers	eur Palmyra and subdura rese des to East) compire divided courion of Christians abdicate	in ion from the control of the contr
300	Quarrels between branches of the Christian Clurch land to persecution of the Arizon.			518 Circ effective midde legal.  122-317 Combanities the Great sole roller capital remove engage recognition.  225 Eeg uniting of EUTONIC MIGRATIONS into the Er 125 Eeg uniting of EUTONIC MIGRATIONS into the Er 12 is signified deficial Promote army at Additionals.  Tanafecture the Great last quite of austod engage.  135 Empre united airs telepose such or according to		Empire s/e
400						395 1453. EASTERN OR BYZANTINE EMPIRE. For near by 1 600 years a de- fease against Amatic investions

# II. MEDIEVAL AND MODERN HISTORY

	11. ME	DIEVAL AND W	IODERN HISTO		
	WESTE	ERN EUROPE	ENGLAND	EASTERN EUROPE AND OTHER COUNTRIES	
			Rnmans rule Britain since about 43-81 A.D.; Christianity introduced; Hadrian'a wall begun (121).	375. Visigoths cross Dannle; defeat Romans at Adminoste (378).	
	recognition of Theodosius (see .	claimants of Empire in West ended by Eastern Europe). ern Roman Empire an permanent division		395. Death of Theodosius the Great, last ruler of united Roman Empire. 395-1453. EAST ROMAN EMPIRE (Arcadius empera, 395-405).	
400	410. Sack of Rome by Visigoths (414).	under Alaric; Visigoths move into Spain	410. Roman legions withdrawn.		
	<ol> <li>Vandals cross from Spain in</li> <li>Attila the Hun defeated at C</li> <li>Odoacer, German mercena</li> <li>Western Roman Empire.</li> </ol>	ry, displaces Roman emperor; end of of Franks in Gaul (Merovingians); be-	449-700. Angles, Saxons, and Jutes conquer Britain ("Angleland" or Eng- land).	474-491. Zeno eastern empera.	
500	511-751. Decline of Merovingian Palace. 568-774. Lombard kingdom in I	kings of Franks and rise of Mayors of	577. Battle of Deerham; West Saxons reach Bristol Chaonel. 597. Augustine reintroduces Christlanity.	527-565. Justinian emperor; Roman law codified; Varials in Africa and Ostrogoths in Italy overthrown.	
	613. Queen Brunhilde of Austrasi and drapped to death by wild I 657. Pepin of Heristal becomes M (Battle of Testry).	a (Eastern Frank-land) captured, tortured, corses in Merovingian quarrels. layor of Palace for wholeFrankish kingdnm	607. Chester sacked and left desolate for 300 years.	622. Mohammed's flight from Mecea (the "Hegira"); founding of Mohammedan religion.	
	711. Mohammedans from Africa 732. Franks (Charles Mariel) de 751. Pepin the Short (Mayor of and takes the crown (Caroling)	overthrow Visigothic kingdom in Spain. feat Mnhammedans at Thurs (in France). the Palace) deposes last Merovingian king ian rule).	755-794. Offia king of Mercin.	750. Mohammedans rule all western Asia, northern Asia, and Spain—from Indus River in the Pyrenees.	
800	800. Charlemagne, king of the F	ranks and ruler of most of western Europe	627. Egbert of Wessex unites England.	809. End of brilliant reim of Harun-al-Raschid, calil d	
900	Frame and Germany.		871-899. Alfred rules southern England; Danes checked.	Bagdad.  852. Russian kingdom founded by Burik the Northman (Kief. capital).  905-959. Constantine VII	
	(Rollo), the Northman; de-	GERMANY AND ITALY 911-918, Chnrad I (Franconian) first mnn- Carolingian king. 936-973. Otto I, the Great (Saxon), ends anarchy in Italy; defeats Hungarians	reconquered from Danes.	903-959. Constantine \\ ("Born in the Purple") emperor, patron of literature	
	France. 937. Hugh Capet chosen king (Capetian line); Feudallsm	(955); revives Empire (962).	950. Danish invasions renewed.		
1000		1002-24. Henry II (the Saint), last of the Saxon line. 1075. Investiture conflict begun by Pape Gregory VII (Hildebrand) and Emperor Henry IV (1036-1106).	1042-65. Edward the Confessor king.	1000. Northmen discover America (Greenland discovered, 984).	
	PERIOD OF THE CR	USADES—TO RESCUE PALI le's crusade under Peter the Hermit fails. I kingdom of Jerusalem.	ESTINE FROM MOHAMMEDAN RULE—1096-1291.  Crusade of nobles under Godfrey of Bouillon and others takes Jerusaled		
1100	1109-37. Louis VI (the Fat) establishes order in crown possessings.	1122. Concordat of Worms ends investiture conflict.	1100-35. Henry I ("the Lion of Justice"); a charter issued.		
	1150-1223. Philip Augustus; recovers Normandy, etc., from England.	1152-1190. Frederick Barbarossa (Hohen- staufen); quarrel with pope; defeated by league of Lombard towns.	Conquest of Ireland begun.	1187. Capture of Jerusalem by Saladin.	
4000	Withingthen with ourself healthing	prigrimages to story 1 faces.	hilip Augustus of France; Emperor Freder		
1200	of Frederick II.  1226-70. Louis IX (St. Louis); good rule. Crusade to Egypt	pope: Firth Crusade (1229-29). 1254-73. Interregnum in Empire.	Anjour forced to grant Magna Carta (1215).	by Venetians. 1206-27. Genghis Khan cor- quers China, Persia, Turke- quers China, Persia, Turke-	
	(1248-54); to Tunis (1270). 1225-1314. Philip IV (the Fair). Power of king increased; quarrels with pope.	1273-91. Rudolph of Hapsburg king of Germany.	1	Confederation (Battle of Morgarien, 1315; Sempan	
1300	1302. First meeting of Estates-	1295. Marco Polo returns from 20 years' travels in China and the East.	a demonstrate to delta deleverado de la color	1386). 1297. Fall of Acre; ead d Crusades.	
	General. 1302. Battle of Courtral; Flem- ish townsmen defeat French	Giotto, Michelangelo, Da Vinci, Raphael, Titian.	1327-77. Edward III.	1331-55. Stephen Dushau riles	
	knights. 1305-77. "Babylonian captiv- lty of Popes" (papal residence at Avignon, France). 1328. Philip VI (Valoiz) be-	Bohemlan line. 1348. Black Death appears in Florence and	1337-1453. Hundred Years' War with France. English victories at Crecy (1346) and Politlers (1356).	an extended serons	
	1 Dichery, 1000, was ichewed.	Home		1354. Ottoman Turks min footbold in Europe (Galif- poli).	
	1369). 1364-50. Charles V (the Wise).	1378-1417. Great Schlem (two, later three, claim to be pope).	1	1389. Serbs defeated by Turks	
<u> </u>	Gueselin.	1320. Venice crushes Genoa at Chioggia	1393. Henry IV  Lancaster) overthrows Richard IL	in great battle at Kossova.	

FRANCE	GERMANY	STALY AND PAPACY	GREAT BRITAIN	_OTHER COUNTRIE
renewed to reign of Charles	1410-37 Signmund emperer 1419-36 Hussile Wars, (2hka blund leader agussat Ger	John Hoss burned as	Prace (Aglaceurt 1415)	
VI linears after 1392) 629-31 Jose of Are saves	maga) 1640-30 Frederick III   Here-	beerto  14151	1450 Jack Cade a tebellion,	
Frence, (War ends in 1653	8019) emperer 1450 Gateaberg inventa gent- ting.			1453. Tarke take C
a ma in France szcept Calain )	ing.		Rosse Gloruse of York	
France		Neficipies Floract		1482. Colentinas discon America
177 Charles the Bold of Burgundy everthrown his			d frata Sybard III (York)	1492 Conquest of G. ada Moors expell of
duchy annexed to France	1493-1519 Maximilian f em-	1454 bt Spresenta et	at Bosworth and ends war	
Italy (Italian ware begin)	1493-1519 Maximilia t em- perce	fettgis refirm in Flie-	Strong anguarchy retali-	1497 98 Vasce da Ge I seches India by sea
			1500 CF Henry VIII sens.	
Charles V over Milan Re-	1517 Luther begins Protestant Reformat on Diet M Warns condemns Lether (1521)	Manhalancely and	tarium of English Church	ormation in Sw tacels 1519-1522 Magel an
France.	SCIS-48 Charles Vinder Smith	Raphael)	156"-55 Edward VL	commander the gle 1536 Calvin began Re-
	1513-38. Charter Visites Spring Germany Reinstriands parts of Italy and America. Op- poses Luther warn against	(Propr. Austria, France		mation at Genera
	poses Luther wars against	and Space) against Ven	2553 58 Queen Many pestures Catholin Church	1540 Jasuit order foun
	Turks (15 0-32) statestes (1555-86)			1558-98. Philip 11 mece
	1555 Religione States of Augehurg (toltracen of	(Medica) pateen of arts	tablishes Church of Esga	by Loyota.  1558-98. Philip 11 merce has father Charles V Bram, Italy Notherlan and the Now World
542. Huguerot Were begin ISt Bartholomew a Massacre	Augehurg (toleracen of Lutherane)		fand Growth of sea power sedes       development.	155s Revolt of Noth
1572)	1554-64 Ferdmand L	18 Rema.	El rabel han period of litters	litte Revolt of Neth lends against Spain is of Leydra (1574). Un- of Useicht (1570). d larst og of andropende by the Dutch (1581).
585 1810, Heavy IV (Brush	1563. Council of Trant ands	Found and Venire against Turks Sectle of Lapsets,	1588 Spanish Armada da- stroyed	of Directs (1579) d
Buguengt wars (15%)	south.)	1572)		by the Dutch (1551)
			1603-25. James J (Stuart)	
			1803-23. James 3 (Stuart) personal un on of England and Scotland 1607 Amps a celony found	1811-32 Gustevna Ad
10.40 Toma TTD 1 to				phus king of Sweden
f10-43 Louis XIII politi tal power of the Rugsegots crushed (Richallay thing	1918 41. Thirty Years Was Imperated (Catholic) gra- erals Tilly and Wallenstein Garravus Adalphas. Frotos		seried (Boston, 1430) by	
ecushed (Michelley chief	erals Tilly and Wallenstein	between See a (which	Puritare foring persecut on	
	Garravus Adalphas, Frates	potented Militaly and	en England	in China
	nat at Leigzig (1:31) Litzen		Marates Moor 1966	1544 Meantra rais ber in China 1544 Spain recognized dependence of the Du Notherlands
	tace k ag of Swed a vectors can at Labring (1031) Listen (1537) Peace of Westphalia (1545)		to England 1642 48 Civil was believed. Crown and Parlament. Maraten Moot (1944 Naseby (1945) Charles I energiad (1949) England a	Netherlands
MS 1773. Louis XIV nu-	8860-83 Growth of Protein ander the Greet Elector	Page 111		
extravagual court of Ver-	ander the Greet Bector		1653-58. Cremwell rule a England Scot and stud Iroland as Lord Protector	
French literature.			Lebes as Lord Protector	1672 1715. Palet 1
	2552 Vienne berfeged fer		1990 Singit seeleralien mader Charles II	Great sound in on western culture in Run St. Petersburg from
	last time by Turks rescued	1636 Vouce your Atterna	tine" rapels James II and wate Will am and Mary	St. Petersburg Issue (1703)
635 Ed et of Numbe resoked and toleration of Huguenote	1683 Vienze berleged fet last fine by Turks record by King John Schleckl of Poland	Turks makes conquests		1817 1718. Charles XI
ended.		33 350ML	tablehrd.	Santsa
701-13. War of the Seasith	1701 Elerter of Braudenburg		1701 15 England takes part	
Succession, Treaty of Litrachill			on Nar of Yeauth Succes- son (Blackett 1704)	1709 Battle of Pulton
eests Frees h prince (Philip V) on Somme threne.	1'01 13 Austras falses part	1714 M has haples etc.	1702 16. Anna queeta.	trushed by Remu.
713 74. Louis XV debauchery al court France sids Prusss	Prosta. 1701 13 Austras falses part ps War of Speakla Successaion. 1713-40 Predirick William I develops Prost an accor	tresty	become king growth of	
10 Anstriac Sacromora Waz	1713-40 Fredirick William L. develope Fruer in newsy 1740-83 Maria Tharese cores of Bohema and Hummy archémicou of Anetena Was of Anali lan Succession 1740-475	tion from the Moreil	1761-ti England aids	
France ands Asstras agrared Pressa loses Causda and India to British	of Roberts and Businery			
India to British	architeckees of Ametria Was	1785 Spensh Brottom established in Nopre 1718 Tunner prets to	1745 facebete rebullion	1783 95. Carberine II e
Astono tie of Austria queen)	(1740-45) H (The		1758 63. Seven Years Wat	press of Rusea.
referm measures defeated 1784 95. Franch Baselution	(1740-45) 1740 St. Fraderick H (The Great) scart Shes from Averton and relate at the	bend of Marie Thoron	Carada actuli ed supremi	
	Great) seast 5 hea from Autoria and refa as rt m Street Years' War (Suttles of Resabach and Lauthen 1757) builds up Francisco		1756 53. Seven Yanna Witt England alba Prussia Carada acquired supervis- ary estab ahed in India Stricta Empire hearted 1774. Indiastrial Revolution	
National Assembly [1789]	of Restach and Lauthen			
(1791) kmgshto abclished (1792) Lania XVI executed (1793) Reign of Terror	peace time.		spon ng yeng	1772 of Paland ca
(1793 Raign of Torror (1792 94) Dill ectory entab-	altempts seforms to Hape-	1790 Happing strade	American telepion. 1783 6 tub coloquation of Australia largus.	1772 St. Paland ga Illianed among Russ Prusta and Austria.
Inbed (£705) 1796-99 Rise of Manolauti	1790 BL Leopold II emperer	Italy stope of Mantus	Australia begus	A PART OF AUTUM.
Senapaste to be First	peace time.  1765-90 Joseph B emperer  altempts seferms to Hap- burg lands  1790 82. Leopold II emperer	set up by Burspatie.		
Tourse	E FRENCH REV	OLUTION AD	O BONAPART	E-1792-1815
WARS OF THE			1312 Napelson Invi	dse Rossia sark of M
	and the second second	realed at June.	eow pricests with	teary America.
1795. Bonsporte a Italian Cam 1789. Egyptisa expedition	theritor 1808 Lithean	a defeate Audicase at Wi		sted in three-day battle

	FRANCE	GERMANY	AUSTRIA-HUNGARY	ITALY		
1800	izen king"). Conservative policy, 1848. February Revolution; Louis Philippe abdicates, republic proclaimed. 1843-52. Second Republic (Louis Napoleon, president). 1851. Coup d'état of Louis Napoleon, proclaimed emperor (Napoleon III, 1852-70) 1854-56, Crimean Wat. 1859. War with Austria in hehalf of Italy 1861-67. Attempt to found a monarchy in Mexico falls (Maximilian)	1806. Confederation of the Rhina formed. 1806. Holy Roman Empfra dissolved. 1809. Carlsbad decrees passed by German Diet suppress liberahism. 1834. German Custinus Umnn (Zollverein) formed, a first step timard unity. 1840-61. Fredarlick William IV krog of Prussia. 1848-49. Frankfort Parliament in unite Germany fails, liberal uprising fails 1851-83. William I king of Prussia 1852. Bismarick hecomes chief minister 1864. Schieswig and Holstein taken from Denmark by Prussia and Austria. 1866. Austro-Prusslan War neer Holstein. 1867-71. North German Confederation under Prussian leadership 1871. German Empira proclaimed, William I emperor, Bismarck ehancellor (1871-90). 1882. Tripla Aillance with Austria and Italy 1884. Germany begins African colonization. 1858-1918. William II emperor. 1859. Germany phtains Bagbdad milway con- eession from Turkey.	Austra.  1509 Metternich becomes minister of foreign affairs; reactionary leader of Europe (1815-48).  1815. Congress of Vienna; treaty of Vienna signed, "Holy Alliance" formed by Russia, Prussia, and Austra 153-48 Ferdinand I; reactionary rule.  1849 Hungarian war for Independence fails (Kossuth).  1850. War with France and Italy.  1856. War with Prussla. Austria withdraws from German Confederation and loses Venetia.  1860-100 Count Tisza, hheral leader, pursues policy of "Magyarization" in Hungary; economic development.  1882. Tiple Alliance formed by Austria, Germany, and Italy.	of small states under Austraa dommaton. \$30. Revolution falls. \$30. War with Austraa Austraa control broken. \$60-61. Garibald: conquers and unites Italy (except Rome) under Victor Emmanuel, lungdom of Italy proclaimed. \$70. Rome taken irom pope and made capital \$82. Triple Alliance with Aurtra and Germany \$66. A byssion; and Germany \$66. A byssion; taken it ake at Adows.		
1900	omes.	1911. Enormous growth af Germany in popula- tion, industry, and trade, 1911-13. German standing army increased from 515,000 to 866,000 mec. 1912. Socialists make cams in Reichstac.	1908. Austria annexes Bosnia and Herzegovina. 1914. Archduke Francis Ferdinand II assassinated in Bosnia by Serbs.	900, Victor Em- manuel III be- comes kizz. 9f1-12. War with Turkey; Italy takes Tripoli 912. Universal suffrage rotro duced.		
		THE FIRST	WORLD WAR	AND		
	WESTERN FRONT	EASTERN FRONT	OTHER FRONTS AND EVENTS			
1914	Sept. 6-10 German invasion of France	AugMay, 1915 Russians invade Galicla and	Aug. 1. Germany declares war on Russia of Aug. 3. Germany declares war on France, Aug. 4. Germany invades Belgium. Engl.	over monutation.  Russia's ally.  land declares war		
1915	the Germans at Yores (AprMay); by the Allies above Arras (May-Juce); by the Germans in the Argonne (July).	Jone-Oct, Austro-German drive into Rus- sian Poland; capture of Warsaw (Aug. 5); Brest-Litovsk (Aug. 25); Vilna (Sept. 18).	May 7. Lusitania suok; 1,198 lives lost. May 23. Italy declares war oo Austria. Oct. 13. Bulgaria mins Tentonic allies.	s Serbia.		
1916	Feb-July. Terrific German attacka or Verdun fall. ("They shall not pass".) July-Nov. Allies gain in the Battle of the Somme at heavy cost in lives.	Aug -Dec. Rumania Invados Transulusation	JanFeb. Austro-Bulgarian invasion of	Montenegro and		

#### III. MODERN HISTORY BETWEEN

| Continued on next page | Labra disaster at Caparetto; Allenby's Pales time campaign takes Jerusalem (Dec. 10).

Germany.

government

Allouna. Mar. 9. Portugal joins the Albes. May 31. Naval battis of Jutland; German fleet withdraws. Aug. 4. Italians take Gorizia (Aug. 9). Aug. 27. Rumania joins the Albes.

Jan. 31. Germany announces unrestricted submarine wer. Feb. 3. United States severs diplomatic relations with

Mar. 15. Czar of Russia dethroned; Kerensky geis up

Apr. 6. United States enters war; Panama, Cuba, Libers Brazil follow,

OTHER COUNTRIES

### WESTERN EUROPE EASTERN EUROPE 1918. Oct. 31. Hungary declares itself independent republic. 1918. Nov. 12. Republic of Austria proclaimed. 1919. Treaty of Versailles; France regains Alsace-Lorraine. 1919. Irish declare independence. 1920. Danzig and Saar Yalles put under League of Nations. 1922. Irish Free State inaugurated. 1922. Fascists control Italy, Mussolini prime minister. 1924. British Labor Government; Italy annexes Fiume. 1925. President Ebert of Germany des; Hindenburg elected. 1926. Hernot and Poincaré premiers of France, Germany admitted to League of Nations. 1927. Italian government curbs labor. 1928. Fascist Grand Council supreme power in Italy. 1918. Republic of Poland proclaimed. 1918. Czechoslovakia established. 1919-20. Greece obtains Thrace, Emyrna Irom Turkey. 1921. Polish constitution adopted. 1922. King Constantine of Greece abdicates. Prince George hung of Greece. 1924. Lenin dies; King George of Greece deposed and republic proclaimed. 1926. Fluidsk dielator of Poland. 1927. President Masaryk of Czechoslovakia re-elected. Sozialski rots in Vienna. 1928. Trotzky banished from Russia. 1920. League of Nations established. 1920. Treaty with Yugoslavia gives Istra and Gorina to Italy; Flume a free state. 1921. Limitation of Armaments Conference in n asungton. 1922. British end protectorate over Ecypt. 1924. Pictures sent over wire and by radio 1927. Radio-telephone between England, Unit-Washington. ed States. 1927. Motion pictures sent hy radio ("television"). 1927. Lindbergh makes nonstop flight New 1928. Trotzky banished from Russia. York to Paris.

Mar. Germans withdraw to Hindenburg Lina; lay waste to country on 50-mile front.

fron. Apr.-Dec. Repeated Allied attempts to break lina at Arras (Apr.-June); Vimy Ridge taken (Apr. 9-121, Alires attack along Alisne (Apr.-Nov.); in Flanders (July-Dec.); at Cambral (Nov.-Dec.).

1917

(Continued on next page)

Mar. 15. Russian revolution destroys effectiveness of Russian army.

July. Russian offensiva on Eastero front fails.

Sept. 3. Riga captured by Germans.

#### ERNHISTORY (Carelyded

ERNHISTO	RY (Conclu	ded)						
GREAT BR TA N	RUSS A	TURKEY AND THE BAL	KANS OTHER COUNTR ES AND GENERAL PROGRESS					
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98 D Edward VI & g  D Commonwest for Austra a cramed  O Commonwest for Austra a cramed  O Color Course VI & g  Pawer of House of Larde m ed  E & I sh Home Ru & B passed expende		Terkey by Young Tarks 9 2 Turce- in in War 18 2 3, Ra van Wars 5 allies conquer most a T in Europe	ion ii 60 Floor etp and Subt, by Wrigh both: 1055 Us on of Sweden and Norway 6 - 607 Both of the Sweden and Norway 6 - 107 Both of Peace Con present at The Hagest. 9 0 Partingal Decomes respit is 9 1 Featured to Predicated in Ch on 9 4 Paramat Cana Special in Ch on 9 4 Paramat Cana Special in The					
THE PEACE S	ETTLEMEN	T-See Also Chron	ology					
WESTERN FRONT	EASTERN FROM	4 0.	THER FRONTS AND EVENTS					
1918 4 Me German d'extrolled (Mer 8 10 12 12 12 12 12 12 12 12 12 12 12 12 12	Con awa of join to make the ma	p o d nl presi.  p Finland in fit Presi de pr. 10. Bu ps. g mm us oct. 30. Techny oct. 30. Tec	with won lays d wa has Fourteen Panha. In you were resulted as you want to be a good of the second o					
	THE PEACE	SETTLEMENT	<u> </u>					
	1919  4. I Para Chinese I FIF Albed and Amora ST we note as Vene as T performs park of a greater on the ST T setty in Communing the ST was an included a set of community and the ST T setty in Communing the ST T was an included a set of the ST T will be set of the ST T will be set of the ST ST T will be set of the ST							
1920 J 4 Treaty with Hungary signed border states. A g 0 Treety with Talkey g rd Am T key dutch b cd am	Y anen, H ganan begedanta e See on Turk ones half her pap the P were an mend factor. N in-	etablished with restoral co- timated weather of his field h. Tu bey placed in	ems as to Rumanus, I g -Slavas, and other emitory h Stra ts satem taxonis of ann b of 23 by T saty of Laussians.					
TWO WORLD W	ARS							
WESTERN EUROFE		TERN EUROPE	OTHER COUNTR ES					
220 taly eads quarre with pope Valcan S 72. Bin not Fra dies Fried a D w coded by Lebrum Hindenburg passeded S 181s. Naw Reve at on its Garmany H or b 72 in 19 in 19 G man y os on Leagu S 18 in 19 i		e eding Pals hego F a Year Fin f serving K a Year Fin f serving an moment through solice Acutra serie descript an ted to Learn of Natura or of Inspecieus assessmanted Principles o Poland des Acred on Greece.	928 Many nations up Kellogy-B and peace part. 129 croma d npbl Gnd Zeppe n, 8 or Sept of the world. 25 Spain becomes repub ic King Alfonson. 25 Jan Sept of the King Alfonson. 25 Jan Sept of the King Alfonson. 26 Jan Sept of the King Alfonson. 27 Jan Sept of the King Alfonson. 28 Jan Sept of the King Alfonson. 29 Jan Sept of the King Alfonson. 29 Jan Sept of the King Alfonson. 29 Jan Sept of the King Alfonson. 20 Jan Sept of the King Alfonson. 2					

# MODERN HISTORY BETWEEN TWO WORLD WARS (Concluded)

# WESTERN EUROPE **EASTERN EUROPE** OTHER COUNTRIES 1935. New Russian constitution. 1937. Russia ands Spanish Inyalists. 1938. Czechosluvalia loses une third uf area to Germany, Pulsand, Hungary. 1930. Russia signs nonaggression pact with 1936. George V of England dies; Edward VIII ebdicates after 11 mnnths; George VI becomes king. 1937. Chamberlain English premier. Germany aids Spanish 1936-37. Civil war in Spain. Transatlantic airplane service begins. 1936. Italy annexes Ethiopia. Germany reco-cupies Rhineland: Italy, Germany, Japan combine against Communism. 1935. Germany annexes Austria; France and England abandon Czechoslovalia by accepting Munich Pact with Germany. 1939. England and France guarantee Pulish independence. 1937-38. Japan attacks China in undeckred war. 1935. Austria becomes a German state. 1939. Italy annexes Albania. Germany seizes all of Czechoslovakia. Fascists win Spinish civil was. THE SECOND WORLD WAR - See Also Chronology in Fact-Index **EUROPE ANO AFRICA** PACIFIC OCEAN AND ASIA (Dates Refer to Local Time) Sept. 1. Germany invades Puland. Sept. 3. Britain, France declare war. Sept. 17. Russia necupies Fast Poland. Sept. 27. "Undeclared war" continue Warsaw surrenders to Germans. Oct. 14. German U-boat sinks British battleship Royal Oak. Nov. 4. Roosevelt signs between China and Japan. Neutrality Act. Nov. 30. Russia invades Finland. Oec. 2. Russia captures Finnah port of Petsamo. Dec. 17. Germans scuttle Admiral Graf Spee in harbor of Montevideo, Uruguay. First Canadam troops land in England. 1939 1940 Mar. 2. Russians crack Finnish defense. Mar. 12. Finland and Russia sign peace treaty. Apr. 8. Germany necupies Denmark, invades Norsay, May 3. Allies evacuate Norsay, May 10. Germany invades Belgum and Netherlands. May 14. anese war continues. The Netherlands surrenders, May 23. King Leopold surrenders Belgum army in Germans. May 23-June 4. British and French troops fee from Dunkirk to England. June 5. Battle of France begins. June 8. Norsay surrenders, British withdraw from Narvik. June 10. Italy declares war in France and Britain. June 14. Germans enter Pars. June 22. France signs armstice with Germany. Aug. 8. Germany begins air stacks in England. Aug. 25. First British planes bomb Berlin. Sept. 27. Japan joins Rome-Berlin Aris. Oct. 6. Germany ends large-ecale daylight raids on England. Oct. 10. Germany occupies Rumania. Oct. 27. DeGaulle sets up "Free French" government. Occ. 9. British strike back at Italians in Egypt. "Undeclared" Chinese-Jap-Feb. 5. British drive Italians from Egyptian Sudan. Apr. 3. British yield Bengan, Libya, to Axis attack. Apr. 3.0. British pield Bengan, Libya, to Axis attack. Apr. 3.0. British Inres leave Greece. June 22. German junvales Russia. Italy declares war nn Russia. Oct. 31. U-boats sink U.S. destroyer Reuhen James off Iceland. Nov. 22. German's tale Rosint, key to Caucasus. Dec. 11. Germany, Italy declare war on United States. United States declares war nn Germany, Italy. July 21. Freuch give military control of Indo-China to Japan. Oct. 18. Tojo appointed premier of Japan. Nov. 20. Japanese submit "last proposals" to United States. Occ. 6. Roosevelt appeals in Hirohito in intervene for peace. Dec. 7. (Dec. 8 in Far East.) Japanese attack Pearl Harbor, Wale, Ginn. Philippines, Hong Kong; invade Siam. Dec. 2. United States declares war on Japan. Occ. 23. Wake Island surrenders to Japanese. 1941 Jan. 23. Gernan Afrika Korps recaptures Bengasi, Libva Mar. 28. British Commandos raid U-boat base et St. Nazaire. May 12. Russia counterattacls on Kharlor front. July 1. British stop German drive in North Africa at El Alamein. Aug. 24. Nazis advance on Stalingrad in Russian Caucasus. Nov. 8. American troops invade North Africa. Nov. 14. Allied troops eater Tunisia. Nov. 27. French scnttle fieet at Tuulon tu prevent Axis seizure. Jan. 2. Japanese enter Mania. Jan. 23. Japanese enter Mania. Jan. 23. Japanese invade Solomons, capture Rabaul on New Britais. Feb. 15. Sinzapore falls to Japanese. Apr. 18. Doolittle fliers from Hornet raid Tokyn. June 3-6. Japanese invade Alentian Islands; Americans repel attack on Midway. July 21-22. Japanese land at Gona and Buna in New Guinea. Oec. 9. Allies take Gona in northern New Guinea. Nov. 27. French scuttle neet at 1 minor to prevent Axis seiture. Jan. 18. Russian army lifts siege of Lenngrad. Feb. 2. Russians defeat Germans et Stalingrad. May 12. German resistance ends in North Africa. July 8-10. Allies invade Scitly. Sept. 3. Allies invade southern Italy. Oct. 1. Allies take Naples; German retrest to Volturun River. Oct. 18. Allies force Germans from Volturun defenses. Nov. 6. Red army liberates klev during winter offensive. Oec. 9. Allies take Gona in northern New Uninea. Feb. 8. U.S. forces completely occupy Guadalcanal. Mar. 2-4. Allies bomb Japanese convoy in Bismarck Sea. May 30. Americans capture Attu in the Alentians. Aug. 5. Americans take Munda on New Georgia. Sept. 16. MacArthur's forces capture Lae. New Guinea. Nov. 24. Americans conquer Tarawa and the Gilberta. Dec. 26. Marinea land at Cape Gloucester, New Britain. Feb. 1. Americans and np. Kwaiselin in Marshall Islands. 1943 Nor. 6. Red army liberates Kiev during winter nifensive. Jan. 22. Allies land at Annio beachhead in Italy. May 9. Ruesians recapture Serastopol after 24-day siege. May 18. Allies capture Cassinn. June 4. American 5th Army enters Rime. June 6. Allies invade France at Normandy coast. Aug. 15. Allied armies invade sonthern France. Aug. 25. Americans march into Paris. Sept. 5. Russia declares war on Bulgaria. Nov. 22. American 3d Army tales Metz. Dec. 16. Germans counterattack in Ardennes (Battle of the Bulge). 1944 Dec. 2b. Marines land at Uspe Gloucester, Now minim. Feb. 1. Americans land on Kwajslein in Marshall Islands. Apr. 3. American forces occupy Bikini atull. June 15. U.S. Marines invade Gaptan in the Marianas. July 21. American Marines invade Guam. Sept. 15. U.S. Marines invade Pelelin in the Palaus. Oct. 2b. Americans begin Philippine campaign; invade Leyte. Oct. 23-26. American Navy defeats Japanese in Leyte Gulf. Dec. 15. U.S. forces invade Mindoro in Philippines. Dec. 26. MacArthur announces end of resistance on Leyte. Dec. 16. Germans conneration in Argennes (pattle of the Jan. 17. Red army takes Warsaw. Jan. 20. Hungary riens armistice with Allies. Mar. 7. Americans cross Rhine River. Apr. 8-13. Russians capture Vienna. Apr. 21. Russians enter Berlin, Allies take Bulogna, Italy. Apr. 22. British enter Hamburg. 1945 Jan. 9. Americans invade Luron in Philippines. Feb. 4. Americans enter Manila. Feb. 15. Americans land on Bataan Peninsula in Philippines. Feb. 19. U.S. Marines land on Iwo Jima, conquer island Mar. 16. Apr. 1. U.S. Army, Marines land on Okinawa. June 21. Americans complete conquest of Okinawa. July 5. MacArthur announces final theration of Philippines. Aug. 6. American filers drop atomic bomb on Hiroshima. Aug. 8. Russia declares war nn Japan. Aug. 27. American occupation force enters Japan. Aug. 27. American occupation force enters Japan. Sept. 2. Japan surrenders aboard U.S.S. Missouri in Tukyo Bay. Apr. 22. British enter Hamburg. Apr. 23. British capture Bremen. Apr. 29. Germans in northern Italy surrender. May 2. Berlin surrenders. May 4. Naris surrender Denmark, Netherlands to British. May 7. Germans surrender unconditionally at Reims.

	The Annual Partenders at	oard O.S.S. missouri in Turyo Day.
RECONSTRUC	TION AFTER THI	E WAR
WESTERN EUROPE	EASTERN EUROPE	OTHER COUNTRIES
Pakistan created.  1949. Ten democracies of western Europe ratify North Atlantic Treaty with Canada and United States.  1950. Western Europe gets arms from United States for defense against Communism. Eisenhower named commander.  1951. United States troope go th Europe as defense force.  1952. George VI of Great Britain dies; succeeded by elder daughter. Elizabeth II crushed 1953.  1953. European Coal and Steel Community begins work.  1954. Scalin receives for a transport the services of t	1950. Communist-controlled Eastern Ger- many recognizes Poland's postwar frontiers. 1951. Yugoslavia gets American arms. 1952. Turkey, Greece join the NATO. 1953. Stalin, premier of Russia dies.	China, French Indo-China, Last India- 1947. King Michael of Rumania shiraits i favor of Communist-dominated governmen 1948. Mohandas Gandhi assasinated in India 1949. Chinese Communists overnin China Palestine becomes Israel and Arah Etak

### IV. CANADIAN HISTORY

	PERIOD OF DISCOVERY-1000-1500	OTHER COUNTRIES
1000	1000. Northmen discover America. 1457 John Cabot discovers Norf sundland.	
	FRENCH RULE	1515-47 France I king of France. 1539-43 De Sett a supedition in south
1500	1534. Cartier roasts along Newfoundland, Suplores the St. Learners (1535-1549)	ern United States. 1555-64. Column eltempts to form Huguenot colony in Florida.
1600	1904 Port Reyal (Annapolas, Nova Scotia) first permanent French actibuses of smoled. 1803. Quebec settled by Franch coloniats led by Champilla. 1804 Hoston Ginoviers Hudson Say while searching for the Northwest Favone: England champilladors. 1807 English relimbits from Virginia, a strikes from Since Champilladors.	1607 Jamestown, Virginia, settled by English colonists.
	1675 Enjikh celesish from Virgan a capture pent Royal. Quotac captured by the British (1679). New Prices and Acada research (or Fernick by the twest) of Sil. Germany (1624). 1611 Chemolain surfaves Lake Huron. 1623. We will be three Enjish and French. English attack Anala, (New Scota). capture Quotac Canada 1627. 1621. Lawrence willing arranged to Burkshawa company of One Hundred Associates", acuted New France (1617-26).	1818-42. Thirty Years' Wer in Europe 1870. Plymouth Colony founded by English Perstans.
	1942. Montreas founding by Managements at a relapous colour.  1955-90. Greenilliers and Radiason resch its Management and Great Plance.  1963 Charter of the tempony of Onn Hundred Assecutes. Studend. Here France a toyal colony.  1965 Allouse Gound's automace on Lake Superior.	1643-1715 Louis XXV king of France.
	1870 Hustone Say Company founded in Analous to carry on trude in the new terretory 1872. Finatises the Proving governor of Clouds. 1873. Misroyette and Jajin 4 serves the Missistappi 1873. Misroyette and Jajin 4 serves the Missistappi 1874. La Salle destrong the Missistappi and Lakey the constry for Prace. 1875. This William a Ward., Acade centured by the Drouds actual deep Cache fault companit restored at the Prace of Revuest (1879).	1888 William III of Orange anceads English bloom. 1889-97 War al Leuis XIV over success- a on in the Rheach Polatinate 1894 French actile in Locations.
1700	1701 Detroit founded as French post, Forts Proctome and Determes, and other posts on the Statish frontier	1701 18. War of the Spanish Succession
	Filler 121. "Queen Anne e War" Ennecomful ettack on Quebr Acada entral, France cadre Husten Bay rejon, Newfountjand and Acadis to Green Strain (Treaty of Lunchs 1712)	in Enrope. 1702 14. Annequees of England. 1727-1760 George II king of England.
	Third Copes Area (Mrs. 1967 - Tencorodo state to Quebr Annie about, France antie statue Mysejin, Newsouring and Annie Stope first (Province Statue 1976). The State about 1976 of the State of the State 1976 of t	1740-46 War of the Austrean Succession.
	1739 63. Franch and Jad on Wer Franch deprived from Nora Scotta (1735) British under Welle tep- ture Quebes (1759), New France coded to England by Peace of Parts (1763)	) 1755-63 Seven Years' War to Europe,
	ENGLISH PERIOD	
	1774. Quebec Act period by British Failusment to organize commented for Canada. 1776 Ed. American Revention. Lorgit of the to Casada solvents attack as Quebe tropolar. 1779 Casada control and Opper and Jerum Previous by the Canadactical Act passed by Sentiah Parlaments propilar samplishes established with inspired power. 1778 SP AFRANCH Relation 1778. SP AFRANCH Relation of the Canadactic SP Parlaments.	1783-85 French Revolution, 1793-1815 Wars of the French Revolu- tion and Kappison.
1800	[27] Der Anneder Meissener mehren im Pacific bross  Hill. N. Wer ihr ihr judied State. Kannett steinige is zurück Chenda republied eurwerder G Dermit  (1921) general bende gibt dass Ern (1921)  Hill. Der Steinige der State Ern (1921)  Hill. Der Steinige der Steinig	2013 United States buys Lemmans be- noon from France. 1832. Feel seasonary Reform Art passed by the British Fashamesi 1837 Victoria meetide the British thream. 1845 British Parkerson, the United Electronical Procedures and China
	1947 Waterfar-Addition treaty between creaty permanents of the control of the Con	parallel. 1361-55, Chill War to the United States.
	DOMINION PERIOD  1857 Stillsh North America Act establishments of Country Coun	1965 Atlantic cable laid.
	187. Pelah Merit Aurona Act withholds the Decision of a classic Conference on the Conference of the Co	1970-71. Franco-Promian Wat
	1871 British Cocombie Jales the Union. 1872 Anti Unionat agreeign in Nova Scotis anded by defeat of the party is general electrons.	
	1973 Prince Edward Island admitted to the Union. 1972 Conservative government avertherm because of Casadam Partis Radinoid annudal Alturander 1972 Conservative government avertherm because of 1978 Conservatives because do protectional platform.	1207 First British Colonial Conference.
	Machemile forms Liberal government county histories.  177: Connerties restored or spring heliabetheres is obtain acquaties rights.  1260. Canadian Pathir Salirens finished.  1260. Canadian Pathir Salirens finished.  1261. Canadian Pathir Salirens finished.  1262. Canadian Pathir Salirens finished.	1839-1902. Boor War in South Africa.
	1996-1911 Sir Wilfrid Laurier premute (Liberal)	1901 Commonwealth of Australia
1900	1902 Aliches hamed — County without	1916 Fanking Canal opened. 1916 Imperial Conference sreates Srip- tal Communication of Mations. 1939 War breaks not in Europe
	1995 Afters and Signatures or regioned as personne. 1996 Maries and Signatures or regioned as personne. 1997 Maries S. Branch (L. L. L	1941 District Orders parts Canada in mortical different parts. 1845 United Nations established. 1947 India directed coto independent India (H sid) and Pakantes. 1951 Basidesun I seconda Belgian throng. 1952 Lasted States appledes H-bombs.

# AMERICAN HISTORY-COLONIAL AND REVOLUTION

PERIOD OF DISCOVERY-1000-1600

1000

1000. Leif the Lucky (Northman) discovers America. 1492. Columbus discovers America. 1497. John Cabot discovers Newfoundland, etc.

1513. Ponce de Leon discovers Florida.

1513. Pacific Ocean discovered by Balboa.

1519-21. Conquest of Mexico by Cortex. 1528-36. Narvaez and De Vaca explore the Gulf Region. 1534-43. Cartier discovers and explores the St. Lawrence.

#### THIRTEEN COLO THE FOUNDING O F

ĺ	VIRGINIA			NEW YORK			MASSACH	USETTS	1
1700	1642. Berkeley becomes governor.  1652-55. Self-government under the Protectorate.  1676. Baton's rebellion.	in John Smith, incets (first representa- a), introduced. In royal colony.  MARYLAND  1632 Maryland  1634 St. Mary's settled by English Catholies  1634. St. Mary's settled by English Catholies  1643. Act of tolera- tion for all Christians powed.  1691. Maryland becomes a crown colony.	1614. Dutch tradicional Island  1626. New Amst 1629. Patroon sy 1638 Swedes a Delaware.  1635 Dutch series 1661 New Amst erd am captured by English fleet, becomes New York.  1653. First assembly in New York.  1658. New York.  1659. New York mited to New England under Andros.	estem organized ettle along the Swedsh colony.  NEW JERSEY  1661 New Jersey granted to Briefley and Carteret.  1674 Colony divided into East and West Jersey.  1652 Penn purchases East Jersey.	d on Manhattan  DELAWARE  1623-64. Dutch and Swedes settle west ede of Del- aware Bay and River.  1682. Deln- ware included in Penn's grant.	1623. New 1630. Bostol 1636. Roger 1636. Main 1643. New federation 1645. Free bury: 1652. Massis control ove 1675. King I New Engla rising again pressed. NEW HAMP- SHIRE 1650. New Hampshire separates from Massischusetts.	school at Roz- husetts extends r Maine.  Philip's War in noil Indean up- st extiters sup- thusetts char- ter annulled. 1652. Andres become gov- ernor of New	ed at Dover, Bay Co'cry) elled from Sale RHODE ISLAND	CONNECTOR IN THE PARTY IN THE P
1		! 	<u> </u>	<u> </u>	{	1	<u> </u>	<u> </u>	OV IV

#### GREAT BRITAIN FOR SUPREMACY IN STRUGGLE BETWEEN FRANCE AND

-97. King William's War: New England colonists under Sir William Phips seire Port Hoyal, Acadia; attack on Quebes fails; Peace of Hywick restores con-quests on each side (167) 701-13. Queen Anne's War: frontier raids by French and Indians (Deerfield, 1701; Haverhill, 1705); English capture Port Royal; expedition against Quebee unsuccessful. France cedes Hudson Bay region, Newtonia, Nova Scotia (Acadia) to Great Britain (Treaty of Utrect, 1713), 1744-42. King George's War: Colonists capture Londbury (1/45); reference by Treaty of Air-la-Chapelle (1745).
1755-63. French and Indian War: expedition against Fort Depose in

#### PARLIAMENT CONFLICT BETWEEN COLONIES AND

1763. British ministry adopts rigid colonial policy; Navigation Acts restricting colonial commerce to England strictly enforced; renewal of Sugar Act taxing importations from foreign colonies.

1764. Stamp Act resisted in the colonies. Virginia resolutions [1763].
Congress protects against colonial policy (1765); Act repeated
1767. "Townshend Acts" to enforce trade laws and taring to, pare, ed.
1761 [170]. Beston The Burd of Congress and taring to, pare, ed. riot (1770); Boston Tea Party (1773).

# REVOLUTIONARY WAR-1775-1783

1775. Skirmishes at Lexington and Concord; Capture of Renderoga and Crown Point; Battle of Bunker Hill.
1775. Second Confinental Congress meets.
1776. British evacuate Boston; naval attack on Charlestown fails.
1776. Luly 4. Declaration of Independence adopted.
1776-77. Washington retreats across New York and New Jersey (Battles of Long Island, White Plains, Trenton, and Princeton).
1777. British attempt to cut the colonies in two Bunpoyne's and St. Leger's campaign from Canada fails (Oriskany, Bennington, Saratoga). Howe's campaign against Washington (Battle of Brandywine, occupation of Philadelphia, Germantown).

1777. Concress adopts Articles of Confederation (ratified to state, 1777-78. Washington winters at Valley Forge.
1778. France recognizes Independence of the colonies; arrival of France Rochambeau.
1778. Reinstein. 1778. British evacuation of Philadelphia and retreat found New York (mouth).

mouth).

1778-79. George Rogers Clark marches through Illinois teritory.

Karkaskia and Vincernes.

1772. B-tish defeat Americans and French near Savanrah; British accounts for the Bonhomme Richard and the Savanrah Paul Jones).

#### Paul Jones). TO 178 CRITICAL PERIOD-1783

1785. Maryland and Virginia delegates meet at Alexandria to consider commercial relations of the two states.
1785. Annapolis Convention to commerce of the country cells. 700. Annapolis Convention to consider commerce of the country calls general convention at Philadelphia. 1786-87. Shays' rebellion in Massachusetts, caused by heary time toll prority, suppressed with difficulty.

1787. Northwest Ordinary. porerty, suppressed with difficulty.

1787. Northwest Ordinance organizer government in the Northwest Tell.

370

RY PERIODS-TO 1789	VI.	UNITED	STATES	5-1789	TO 1	PRESENT
De la company de	1789					COUNTRIES
De Sote discovers the Mississippi River D. Coverage services the Southwest. Special South St. Applying the Southwest. D. Russys attempts to establish a sattlement on Russicke. D. Russys attempts to establish a sattlement on Russicke.	1703	1°89-07 George Way 1783 First Congress: Speaks organized. 1785 First 10 Among	what her York	State Treasury	fand Warde	
IRS		underst to state. 1700 First overse po 1709 Stational delete.	mintus 39971e			1
OTHER EVENTS IN NORTH AMERICA		1789-05 Industrial to 1789 First unional to	n the Northwest To sok chartered by C.	enticity materia.		1
Firt Royal founded (first permanent French settlement) Quiber franched by Champisin.		1751 Vermont admirt. 1752. Ets Whitner son	ad Kentucky (17)	) Tannessee (f		1793 War bo
*Hoden discovers Hadion Bay England claims the Hudson 1996s.	}	1704 Genet, et motor 1794 Whisty rebolt s	aus western Pantay	dysom symmit u	ACTUAL PROPERTY.	and England
Marquette and Joffet explore the Mississippi 12 Safe deconds the Mississippi to sta month.		1794. July treaty of sec	aty and sommerce	nijh Great Brita	No.	Terror in Fragos
Detroit founded as French fort and trading posts. French settle New Orleans.	1797	1777 1894 John Ad <sub>0</sub> 3 pr-Frendent Dec	an President (Pa	nderslast) The	Pas Jeffenson	1
<u></u>		1707 X V Z Affair my Acin passed act and it 1700. Virginia and it Sadition Acts servet.	Frenck parturant			
CAROLINA  Charge for Carol na grand- th Lard Citronian and		Ladition Acts servit, I 35 Eleventh Amery 1800. Prundential etc at set erastruré et alute advocation etc	demnt adopted.			1700 Manuface
the Comment and the Comment of the Comme		alists advocating sty 1809 John Marshall g	ing y controllard go made Chief Furt co	everament.		
Charleston senter PENNSYL	1801	1901-00 Thomas & Aaron Surt   Arole	eturos Prendes (1809-65) George	it (Democrati Climan (1965-C	n-Republican) (a) Vice-Presi	.]
1661 Charter for Pennsylva- h a smark-d to Will am Penn		1701-05 War with To 1203 Oble admitted 1705 Cauldana Pony Rundana				1404, Napoleon
1502. Philadef- phie founded		1904 Twelfth Among specificalities		1 mal mouse.		becomes am parce 1800 Napoleon
Overshow of propriet GEORGIA		Hor Depute with C impression of state Hor-to Embargo an that blockade of Eu-	Great Brita o over en (Chesapecka Aft sunst Great Britan	gentral comm air) and Prases to	terms and the tetalistics for	
NOTH MOTORY Delethorie.	1809	1508. Expertat on of ;	slares problemed.			Connell blocked any French lerry torses.
CATH AMERICA-1689 1763	1000	1304 17 James Pfadi Chinon (1909-13) E 1814 14 Indian war			l can) George idents	1810-23 Spanish and Portuguese colonies in Lin- tral and South
Principal capalities against Foreick at Course Point and a Capacities against Foreick at Course Point of Line George, 1750) capacitation of Poreick foreign at 1750 France cades Capa Brillyn Canada, cid. 50 Retain (Treaty of Para 1750)		1312. Emision of his 1812-15 May such G (\$12 1310 Gr) Orleans (\$150 he Eds 1823) Tester	and Bedweek (1926) Creek Britain Com the Date Washings communication (Author)	ucressin' izvano rod (2024 - Za da Perrya Vi	ten of Canada title of Now tury on Laks	America become Independent
Serial (Treaty of Parts 1763)		I say Second palitinal	tenk chartered,	at empergo and	Walt	1 Waterles,
Barton Port B ff cloning the port and other arts to pussely	1817	1516 M My protects		Penning Renni	bluma) P D	lass Treaty of Vienna Hely Al unca formed
First Commenced Congress draws up Declaration of Rights		1827 25 James Mon Tempkins, box-fran 1827 Mindraltyi adi (1529) Minesufi [13 1827 Sentinda India:	I)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
British rectory of Carndon.		Lets Great Br ta a s com of Oregon brests	acid the Custos Sta ocy of Seem			i
It Was to the South Charleston consend by the British the of King's Mountain Compens Galford Eutow Construction to the acts.  Was all Yorkiown surrender of Commaille.		1878. Missout Congr. 1875. Missout Docycle all ages in America.	e parties de parties e de parties becar le se	g survery as tery g the aggression	of the H ly	1g*  Russia attempts to re- strict trade on North Pacific
Principles of Sevenesh and Charleston Bretilities cette. That's of Paris Great Sultain escagnizes the independence		1934. Projective tariff 1834. Internal Engine	Elizada nes baseo.			count.
	1825	1805-29 John Colores John C Calbrert La 1815 Edg Carol tour	y Adams, Preck no-President. photos.	mt (Democrata	o-Republican)	
Peteral Constitution framed by the Constitutional Compan- ration by 11 states by and of 1785		1825 Edg Carel Com 1825 "Tanif of Albert	municipal teriff ho	COMMUNICATION OF THE		1

# VI. UNITED STATES HISTORY (Continued)

	VI. UNITED STATES HISTORY (	Continueu)
		OTHER COUNTRIES
1	823–37. Andrew Iackson, President (Democrat), John C. Calhoun (1823–33), Martin Van Buren (1833–37). Vice-Presidenta. 829. "Spoils system" appointments to office. 820. Webster-Hayne debate on "state rights." 830. Baltimore and Ohio Railway opened, first steam locomotive in America. 831. William Lloyd Garajion establishes The Liberator, a journal advocating abolition of negro elavery.	1930. Independent monarchy established in Belgium.
	SSI. McComnick invents the reaper.  SSI. McComnick invents the reaper.  SSI. New tardi bill reduces duties but retains principle of protection.  SSI. New tardi bill reduces duties but retains principle of protection.  SSI. South Carolina passes ordinance "nullifying" the tardi, Jackson's proclamation denounces nullification; "Force Bill" passed (1832); Compromise tardiff (1833), nullification ordinance repealed.  SSI-SI. Jackson rediccted, system of national nominating conventions beaus.  SSI-3-7. Jackson's war on the National Banks act for renewal of charter vetoed.  SSI-42. War against Seminole Indians in Florida.	1830. Louis Philippe assends French throne. 1832. English parliamentary Reform ET possed.
	1837. Afterness sammaed; interigan (1887). 1838. "Specie circular" issued requiring the payments for public lands to be made in specie.	1835. Texas secodes from Mexico and establishes an independent state.
1 1	1837—11. Martin Van Buren, President (Democrat); R. M. Johnson, Vice-President. 1837. Financial panic, due to over-speculation and unsound financial policies. 1840. Independent treasury established. 1840. "Hard cider" campaign results in a Whig victory.	1837. Queen Victoria of England begins ber long reign.
1841	1841. William Henry Harrison, President (Whig); John Tyler, Vice-President. 1841. Death of Harrison.	
	1841-45. John Tyler, President (Whig). 1841. Tyler yetoes bill to resimblish the antional hank (1841) and bill for a "Fiscal Corporation"; break between Tyler and the Whits; entire cabinet resigns. 1842. Webster-Ashburton treaty with Great Britain settles the Northeast boundary dispute. 1842. Dorr Rebellion in Phode Island secures liberal constitution. 1844. First telegraph, between Washington and Baltimore, completed. 1844. James K. Polk (Gemocrat) elected President. 1845. Texas annexed to the United States; Florida admitted.	
	1845-49. James K. Polk, President (Democrat); George M. Dallas, Vice-President. 1846. Iswa admitted; Wisconsin (1849). 1846. Northwest boundary line settled at 49th parallel by treaty with Great Britain. 1845. Low thriff emocted. 1845-49. Medican War. American victories at Buena Vista (1847); Cerro Gordo (1847); capture of Mexico City (1847). Treaty of Guidalune Hidalgo (1845), Mexico reliaquishes claims to Terne; cedes New Mexico and Unser California to United States. 1846. Wilmot Proviso prohibiting slavery in territories acquired from Mexico defeated. 1843. Territory of Oregon organized without elavery. 1848. Presidential election results in Whig victory. Formation of the Free Soil Party.	1845. Great Britain repeals com her free trade established. 1848. Revolutions in France and lair second French Republic formula.
1849	1842-50. Zachary Taylor, President (Whig); Millard Fillmore, Vice-President.  1842- Ench of gold eschers to California.  1850. Clayton-Bulwer treaty with Great Britain provides that neither country should have exclusive control over any earn) brill acroes Nicaragua or Pannum isthmus.  1850. Death of President Taylor.	
	1850-53. Millard Fillmore, President (Whig). 1850. "Clay's Componise": California admitted as a free state; other territory acquired from Menico left open to shreey; share trade abolished in the District of Columbia; new Fugitive Share Law emarted. 1850. Maine adopts prohibition. 1851. Pail connection established between New York City and Lake Eric at Buffalo. 1852. "Uncle Tom's Cabin' published; stimulates growth of abolition centiment in North. 1852. Tranklin Pierce (Democrat) elected president.	1852. Louis Napoleon proclaimed expert of France.
1853	1853-57. Franklin Pierce, Precident (Democrat); William R., King, Vine-Precident. 1853. Gadssien Purchase settles boundary dispute with Mexico. 1854. Kanasa-Ribraska Bill repeals Misrouri Compromise and organizes Kaness and Nebraska on the principle of "sanatter sovereignty." Civil war in Kanesa between free sinte and elave state settlers (1855-57). 1854. Admiral Perry secures the opening of Japanese ports to foreign trade. 1854-55. "Know Nothing" Parry, a secret party opposed to foreigners participating in American politics, at the height of its power. 1854-55. Movement to add elare territory to the United States; Ostend manifesto favors annexation of Cuba (1854); filibratering expedition to Nirungan (1855). 1856. First Republican national convention adopts anti-clavery platform.	
185	1557-61. James Buthanan, President (Democrat); J. C. Breckenidge, Vice-President. 1857. Dred Scott decision miniains that peither negro slaves nor their descendants can become citizens, that a clave does not become free by being curried to free territories. 1853. Minnesota admitted; Oregor (1859); Kanasa (1851). 1853. John Brown's raid on the United States arsemi at Hasper's Perry. 1860. Abraham Lincoln (Republican) elected president; South Cardina secedes from the Union. 1861. Ten other Southern States secede and form the Contederary.	1851, Italy united under Vision Emmanuel.
186	1851-65. Abraham Lincoln, President (Republican); Hannihal Hamlin (1861-65), Andrew Johnson (1853), Vice-Presidents. 1851-65. Chril War. 1851. Apr. 12. Fort Sunter fired upon by the Confederates. 1851. July 21. Union army defeated at Bull Run. 1851. July 21. Union army defeated at Bull Run. 1851. Senume of Confederate commissioners (Mason and Slidell) from British etemphip nearly leads to war. 1852. Apr. 6-7. Grant's virtory at Shiloth McClellan's perinadar campaign (MarJuly); mayal battle (Mar. 9) 1852. Alary abolished in the District of Columbia. 1853. July 1-3. Union virtory at Gettysburg: Vicksburg explured (July 4). 1853. Mest Virginia admitted as a free citie. 1854. Grant made commarde-in-chief of the Union armies. Sheridan's raid up the Shemandoah Valley. 1854. Nevada admitted. 1854. Nevada admitted. 1855. Apr. 9. Lee surrenders at Appointation Court House. 1855. Apr. 9. Lee surrenders at Appointation Court House.	1853-67. Maximilian attempts to form monarchy in Mexico.

#### VI. UNITED STATES HISTORY (Continued)

		OTHER COUNTRIES
1865	195-60 Andrew Johnson, Prauline (Peru ), in administration of the Marken and Descentified. Pre literation askinding adversery for the "outs! [16 sizes seepend on the Perus [16 sizes seepend on 1981 the Marken and Perus [16 sizes seepend on 1981 the Marken and Perus [16 sizes seepend on 1981 the Perus [16 sizes seepen	1865. Austro-Prussian War 1865. Perteanrol Atlentic cable taid
	Lee Act 1867) and Tentre of Orize Bibl 1850/ 1907 Alloha provinced from Unia - Milemata action to 4. disp Genes 1907 Julianus Deces Front La withdraw surp bean Meuro- 1907 Production Improvinces converting full by the week specified of Benade required. 1905 Production Improvinces convertings full by the week specified of Benade required. 1905 Fourteenth Anciet diment extends officerably to Proadman.	386" Duel monarchy of Austra-Hun- gary artabilised.
1869	1899-77 Ulyssea S Grant, President (Republican) Subsides Collar (1869-23) Plancy Wilson (1872-77) Lice-Presidents	1909 Snaz Canal optned
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	1975-1. Reheated Heyes, Deschut (Docobleus Michael Mic	55°7 79 Russe-Turkish War
1881	1831 James A Gardad President (Republicas) Chester A Arthur Vice-President. 1831 Gardald assessments (143y 3)	
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		OTHER COUNTRIES
1901	1901-9. Theodore Roosevelt, President (Republican); Charles W. Falrbanks, Vice-President (1905-9).  1991. Hay-Pauncefote treaty with Great Britain allows United States to build Panama Canal on condition that it be open to all nations on equal terms.  1902. French interests in Panama Canal purchased; canal zone obtained from Panama by treaty (1904).  1903. Alaskan boundary dispute with Great Britain settled.  1903. Beginning of stricter government regulation of transportation and trade; Department of Commerce and Labor created, railroad rebates abolished (1903); jurisdiction of Interstate Commerce Commission extended (1903); exits brought against trusts under Sherman Anti-Trust Law; Heipburn Act regulating railroad rates passed (1906); Meat Inspection and Pure Food Acts passed (1906).  1903. Prelopment of democratic government; state-wide primary election law in Wisconsin followed by widespread adoption in other states; Initiative and referendum adopted by Oregon (1902).  1903. Wight brothers make first airplane flight at Kitty Hank, N. C.  1905. Intervention in Santo Domingo to establish financial responsibility.  1906-9. Intervention in Guba to restore order following armed revolt.	1902. Trans-Siberian railway opened. 1903. Panama declares itself an Inde- pendent republic; immediate recogn- tion by President Roosevelt. 1904-1905. Busso-Japanese War: ne- diation of Roosevelt results in the Pears of Portsmouth.
1909	1600-13. William Howard Talt, President (Republican); James S. Sherman, Vice-President. 1909. Disjute with Venezuela arbitrated. 1910. Postal savines bank created; parcel port, 1912. 1911. Bills for tariff reductions vetoed by President. 1912. Panama Canal Tolls Act exceed by President. 1912. Arizona and New Mexico admitted as states; territorial covernment established in Alaska. 1912. Arizona and New Mexico admitted as states; territorial covernment established in Alaska. 1913. Sixteenth Amendment gives Congress power to levy Income tax.	1503. Peary reaches North Pole. 1910. George V King of England. 1911. Revolution in Mexico; Dar re- signa. 1911-12. War between Italy and Tur- key in Tripoli. 1911. Amundsen reaches South Pole. 1912-13. Turkish-Balkan warr. 1912. Chinese republic proclaimed.
1913	1913-21. Woodrow Wilson, President (Democrat); Thomas R. Marshall, Vice-President. 1913. Seventeenth Amendment provides for election of senators by the people. 1913. Underwood-Simmons taith lowers daties; Federal Reserve system of banks created. 1914. Fedral Trade Commission created; Clayton Anti-Trust Act passed, craduated income tax law passed. 1914. Panama Canal Tolls Act repealed; canal opened. 1914. Dispute with Merico over "Tamproe incideot"; American troops occupy Vera Cruz. 1914. Neutrality in European war proclaimed. 1916. Taiff Commission created; Adamson Law establishes eight-hour day for railway employees. 1916. Punitive expedition sent into Mexico. 1916. Wilson re-elected on a peace platform. 1917. War declared against Germany (rec Chart III for First World War). 1918. Republican Concress elected. 1918. Armistice sizued by Germany (rec Chart III for First World War). 1919. Elghteenth Amendment establishes nation-wide prohibition. 1919. Teaty of Versalles fails to receive two-thirds majority in the Senate. 1920. Nineteenth Amendment establishes nation-wide woman suffrage.	1914. Direct wireless communication established between Germany and United States. 1914-18. First World War. 1917. Denmark sells Virgin Islands to United States. 1919. Treaty of Versailles signed. 1919. First transmithnite flights, both airplane and dirigible. 1920. League of Nations established.
1921	1921. Warren G. Harding, President (Republican); Calvin Coolidge, Vice-President. 1921. Budget Bill passed establishing budget system in national finance. 1921. Treaty with Colombia ratified paying her £25,000,600 to estite Canal Zone dispute. 1921. Bill passed greatly restricting immigration. 1921. President signs joint Congressional resolution declaring peace with Germany and Austria (July 2). 1921-22. Umitation of Armament Conference at Washington prepares Four Power Treaty between U. S., Great Britain, France, and Japan, for maintaining peace in the Pacific, and Five Power Naval Treaty. 1922. Strikes of coal miners and railroad shop workers keep a million men idle. 1923. President Harding dies (Aug. 2).	1921. Famines in Russis and Clina. 1921. Ex-Emperor Charles mastress- fully attempts to regain throse of Humarry: eniled to Madeira. 1922. European economic conference, including German and Russim dele- gates, at Genoa. 1922. Tomb of King Tutankhamen of Egypt (about 1350 s. c.) discorted near Lutor.
1923	1923. Calvin Coolidge, President (Republican). 1924. Investigation of leasing of government oil reserves to private interests creates national scandal. 1924. Inmigration hav passed limiting Immigration to 2 per cent of foreign-born of each nationality bere 1924. Soldiers bonus bilt passed over President's veto; taxes redoced. 1924. Army aviators make round-the-world flight. 1924. Coolidge re-elected: Charles G. Dawes, Vice President. 1927. Greatest Mississippi River flood erer known causes immense crop and property losses. 1928. Secretary of State Kellogs negotiates "Pact of Paris" by which nations renounce war.	1926. Pileudiki sets up dictatorship in Poland. 1925. British dominions recognied se autonomous units in the empire. 1927. Acute conflict between Mericar government and Churchi controversy with United States over oil and had laws. 1927. United States interrenes to end civil war in Nicaragun.
1929	1922. President Hoover appoints Federal Farm Board.  1929. President Hoover appoints Federal Farm Board.  1929. World-wide economic depression begins stock markets collapse; banks fail; millions nnemployed.  1930. Hawley-Smoot bill raises tanif.  1931. Democratic Honse elected; John N. Garner of Texas, speaker.  1932. Relief measures to meet depression adopted.	1929. Byrd flies over South Pole. 1929. Taena-Arica boundary settled. 1930. United States, Grat Britan, ac. Japan agree on new naral reductions at London Naval Conference. 1931. Great Britain drops gold standard. 1931-32. Japan myades Manchuris, set up Manchukuo.
1933	of gold standard; Soviet Russia recommed. Prohibition (1914) amendment repealed.  1933. Congress passes Wagner Labor Act and Social Security Act. Huge appropriations for work relief.  1936. Supreme Court kills NAA. Philippine independence roted. New neutrality policy established.  1936. Supreme Court kills AAA. Veterane bonus paid, Roosevelt and Garner re-elected.  1940. Huge rearmanent program, peacetime conscription, adopted; 99-year leases for American bases in 1940. Hosevelt needected with Henry A. Wallace, Vice-President.  1941. Lend-lease aid cancet. Japanese attack Pearl Harbor; U. S. goes to war against Japan, Germany, 1944. Roosevelt re-elected-own thermy with Harry S. Truman, Vice-President.	1934. Nari policies disturb Europe, Chancellor Dollfius of Austria, Kirz Alexander of Yugoshvia assessment, 1937-35. Japaneonguers mochol China. 1935. Germany annexes Austria and most of Crechoslovakia. 1940-41. Twenty-one American republics resolve to act jointly for defrase of Western Hemisphere. 1942. Twenty-six United Nations please mutual assistance against Axis.
1945- 1954	1935. Hoosevett dies (April 12), Truman is president: 1947—Army, Navy, Air Force put under one Cabinet  1949—Congress cuts income taxes, votes ERF: Truman re-elected, A. W. Berkley, vice-president,  bomb ordered; forces aid South Korea; 1951—sends arms to non-Communist nations; hydrogen  China on Formoza.  1933. Dwight D. Eisenhower, Republican, inaugurated registers: Elebagt Missa.	1945. Second World War ends. 1946-47. Alües dralt peace treaties with Finland, Bulgaris, Herary, Rumanis, Italy. 1951. France promotes Schumana Fin. 1952. Japan signs peace treaties. 1954. Army ousts Paraguay's president.

### REFERENCE-OUTLINE FOR CURRENT EVENTS







Dr Sa k left describes his antipol o varefue to reporters in his Pittsburgh laboratory. The Salk vaccine was world wide news



Mass inoculation began in 1955 but was stopped after some children contracted polio. After new chacks the program resumed



Dwight David Essenbower II the president a grandson was one of the first vaccinated. He gring with a lollypop after his abot.

This outline is designed to give the student the teacher, and the general reader a clear and orderly review of the chief eventy and trends of our time In so doing it promotes one of the chief aims of educa tion today, which is to train people to understand the responsibilities of this critical period

Common sense tells us that we cannot form intella gent opinions or plan our lives effectively without a general knowledge of what is going on in the world around us This knowledge is not easy to get however The textbooks summarizing and explaining today s history are still to be written. Press and radio over whelm us hour by hour with a confusing mass of facts reports and comments The impact of today s head lines blurs the memory of what happened yesterday

This outline is offered as a guide in the maze. It presents no completed picture but merely traces the general pattern of history in the making

The page references are keys to the vast amount of new material added to these volumes year by year in the various fields that are affected by the march of our civilizati n Thus the outline not only covers political events and advances in science and industry but it also presents an organized view of the social cultural and economic developments of the day

To make relationships clear the outline goes back m many metances as far as World War I Its arrangement is intended to focus attention primarily on current events an I problems on what may be called the world a unfinished business

#### STRUGGLE FOR WORLD MASTERY-DICTATORSHIP VERSUS DEMOCRACY EUROPE IN CRISIS

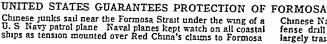
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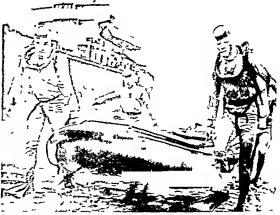
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Chinese Nationalist frogmen beach their rubber raft after a defense drill off the island of Matsu. Nationalist forces were largely trained by United States military and naval advisers.

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EXPERIMENT AND DEVELOPMENTS IN UNITED STATES WEAPONS At left the Navy a Flying Platform on experimental belicop for in surborne A ducted fan powers it by air jets. The plot steera by shifting his balance. At center, crewmen of the steems sub-

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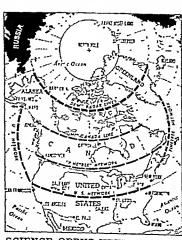
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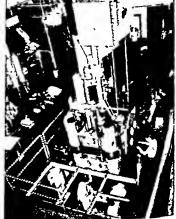
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SCIENCE OPENS NEW FRONTIERS IN DEFENSE AND INDUSTRY

The heavy broken arc lines on this map show the automatic radar warming network of the United States and Canada. The network will detect an air attack from offshore or from the Arctic Circle.

In center are the first man-made diamonds in history. General Electric scientists produced them in 1955 in the 1,000-ton press at right. Pressure was over 1,500,000 pounds per square inch

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For the first time as h story Asun and African fredere met in 1955 Fremses of 29 netions discussed economic co-operation

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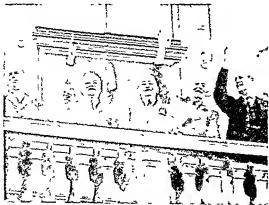






ANOTHER CHAPTER IN THE EVER FASCINATING MYSTERY OF MARS Is there lies there we vegete on on the planet Mars? See the differences in these photographs published in 1955. The derk area near the center in the 1907 photograph is larger in 1936 and

still larger in the 1954 pholograph. In 1907 astronomers thought it a cantal Row it is so large-100 000 square miles—they thank it a new region poss by with plants



#### CO-OPERATION AT VIENNA

Austria became a free nation again May 15, 1955. The treaty was signed by, from left, Pinay (France), Molotov (Russia), Figle (Austria), Dulles (United States), Macmillan (Britain).

- D. Low living standards omang masses L-118. few wealthy families usually own best land S-264, C-174, B-290, A-331, C-253, L-112, primitive Indian culture still dominates many sections S-261-3, C-173, B-291, M-192
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# SOCIAL AND ECONOMIC PROBLEMS AND MOVEMENTS

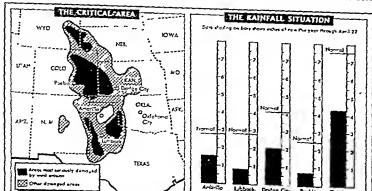
Colorada

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DREAD PHENOMENA OF NATURE HERE AND IN HAWAII

Since 1951 drought has turned parts of seven states into a Dust Bowl. Many "disaster area" counties received federal relief. In 1955 agricultural leaders sought a plan to combat drought.

After some 50 years of quief the Kilauea volcano system in Havain erupted in March 1955. Streams of fiery lava ruined rilages. Kilauea is the legendary home of Pele, goddess of fire



HISTORY PRESENTS A NEW NATION AND A MEETING AT THE SUMMIT

Kon ad Adenauer left was the chancellor who got sowere galy for Wes ern Germany in 1955. At right are the fou beads of From eft Russ a e Prem er Bulgan n Pres dent E cenhower and P em e s Paure of France and Eden of Br tam. Essenhower pro-posed that Russia and the U S exchange air surveys of defenses state who met in 1955 at Geneva to try easing we ld tens on

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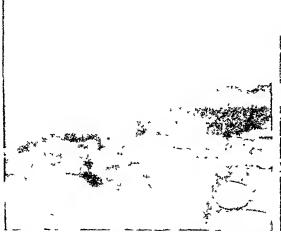
A Training muse of le sure time L-159-61 choos-

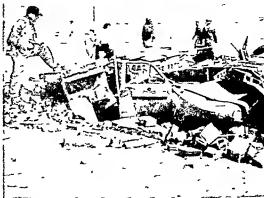


GREAT POWER RESTS IN THE HANDS OF THESE MEN Sir Winston Churchill left vis ts Sir Anthony Eden As prime more of Great B tain and head of the Conservative par y Eden won an easy v ctory in the 1955 general election. George



Meany lef pres dent of the AF of L. and Walter Reuther p es dent of the CLO agree to merge their great labor unions. The his one decis on was made in February 1935





ATOM BLAST AT "DOOMTOWN" ON YUCCA FLATS, NEVADA

Television showed this picture of observers watching the Civil Defense test May 5, 1955. They were eight miles from the blast ing a hobby H-387-401; planning vacation

- activities V-121-32

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Two brick houses, 4,700 feet from the blast, were ruined. Tumbling bricks smasbed this car. Others were unhurt.

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- D. Photoengroving and photolithography
  P-210a-d
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RED CHINA BUILDS TIBET ROAD
This 1,400-mile truck road opens Tibet to trade. Climbing peaks
16,000 feet high, the road links Lhasa, in Tibet, to Yaan, China.

#### ADOLF HITLER-Apostle of DESTRUCTION

HITLER, Apolf (1889-1945) The ree of Adelf story of a frencied ambition that plunged the wild into the worst war in history

An abnormal atmosphere shrouded Hitler a entire his He was born April 20, 1889 at Braunau-am Inn Austria, of German descent. His father Alors was the plentimate son of Maria Anna Schicklgruber In mill die age Alois took the name Hitler from his paternal grandfather After two wives had thed Ab is married his foster daughter, Klara Portzi a Bit a an 23 years younger than he She become Adolf a mother

Hitler's rambling emotional sutobiography 'Mein Kampf' (My Strug gle) reveals his unstable eirly life His father, a petty customs official wanted the boy to study for a gov erument position. But as young Hit ler wrote later the thou\_ht it slaving in an office made me ill not to be master of my own time ' Passively defying his father the self willed boy filled most of his school hours with daydicams of becommag a punter His one school interest was history, especially that of the Germans When his teacher giordied Germany's rôle, we would at there enraptured and often on the verge of tears" From boyhood he was devoted to Wagner a operas that giorified the Teutons dark and furious mythology As a schoolboy he seemed to make no friends. Later he bousted in Mein Lampi that

he had been argumentative and quarrelsome Fulure dogged him After his father a death when Adolf was 13, he studied water color painting, but accomplished little At his mother's death, when he was 19, he went to Vienna There the Academy of Arts rejected him as untalented Lacking business training, Hitler eked out a living as a laborer in the building trades and by painting chesp post cards He often slept on park benches and ate at a chantable

soup kitchen Hatred Nourishes Seeds of Nazi Doctrines These humbling experiences inflamed his discontent He hated Austria as "a patchwork nation," and looked longingly across the border at energetic, powerful Germany. He wrote, "I was convinced that the State [Austria] was sure to obstruct every really great German and to support everything un German. I hated the motley collection [in Austria] of Czecha Ruthenians, Poles, Hungarians, Serba, Croats, and above all that ever present fungoid growth-Jews . I became a fanatical anti Semite"

Ritler's hatred of poverty, his rabid devotion to his German bentage, and his loathing of Jens com bined to form the seeds of his later political doctrine ife studied the political saill of Vienna's mayor and tool, special note of that leader's practise of "using all instruments of existing power, and of gaining the favor of influential institutions so he could draw the greatest pessible advantages for his own movement from such old-established sources of power" Hitles Liter applied this technique in Germany

In 1912 Hitler left wretched Vienna for Munich, a true German town ' There he drifted from job to job as circo ter arelitect's draftsman, and watercol mit Always he ranted about his political ideas It the outbreak of the first World War in 1914, he gave up his tustri in citizenship to enlist in the

> would not fight for Austria, but I was ready to die at any time for my people (Germanal ' In his first bat-Be the Lores offensive of 1914 he shouted the cong Deutschland uber Alles On the Somme in 1916 ie was a prout fighter' against Butish to ke cose to lance corposal, non the fron Cross as dispatch runner and was wounded. In 1917 he fought in the third battle of I pies.

16th Bayaman infantry regiment. He

He was guard in October 1918. T) e armistice found him in a hospital in Pomerania temporarily blinded by mu-tard gas and suffering (com shock The news of Germany s defeat agonized him 'While every thing began to go black again before

I buried my burning head myeves in the casers and pillows He believed that defeat had been caused by enemies within, 'chiefly Jews and

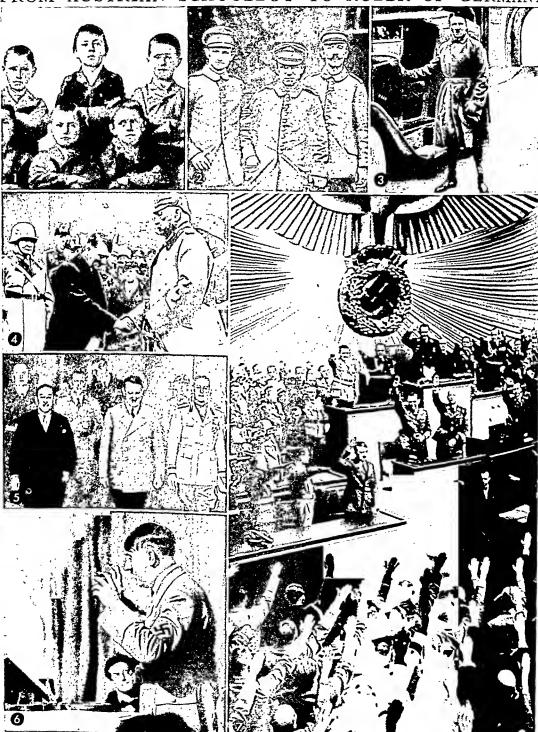
Commun sts, who had stabled Germany in the back " War Makes Hitler a ' Man Without a Country" Now no longer an Austrian citizen and not yet a German citizen, Hitler at the wars and was a man without a country Bewildered he remained in the army statemed in Munich In the political and econome tempest that swept defeated Germany, Munich beran eastermeenter Officersof the besten Reuhmorhe (German army) conspired to win control of Germany They maintained ' informers,' one of whom was Adolf

H tler He was assigned to report on "subversive activities' in Munich's political parties This political spying was the turning point of Hitlor's life One night in 1919 he threaded his way through the Herrenstrasse to a bleak little restaurant where a handful of young people sat around a half broken gas lamp This little band was the German Workers' party Guided by 'mtution,' Hitler joined as its seventh member He soon took the lead Then a Reichswehr officer, Capt Ernest Roehm, saw the party as a possible means of overthrowing the liberal Bararun republic Like other officers, Rochm had built one of the private "volunteer" armes. which grew up as arms of the Reichswehr in defiance of the Versailles treaty Rochm assigned his arrogant,



ADOLF HITLER

## FROM AUSTRIAN SCHOOLBOY TO RULER OF GERMANY



1. Hitler (middle of top row) with fourth grade schoolmates in Austria. 2. With two comrades during the first World War, when he wore a heavy mustache. 3. In 1924, photographed by his friends as he comes out of prison. 4. Hindenburg makes him German chancellor in 1933; Goering stands behind him. 5. With Italian and Japanese delegates at anti-Comintern meeting. 6. Addressing a Nazi party congress. 7. Telling the Reichstag that war has hegun in Poland, 1939.

ron hard Brown Shurt army to aid the Workers' party Bulwarked by these armed ruffians, Hitler became the orator of the group

Creates the Nazi Party

In 1920 he changed its name to Natunalsa.eds. Stake Deutsche Arbeiteprate; (Natunal Socials German Workers' party), abbreviated to var. Sneer ing at the laberal generatures of the various bour goes parties and haing the Communists. Hitter should accusations against the fews and entel out to the Germans to form an all powerful natunals state line voice, torn and hoarsneed by mustirely gas hyperized has listeners as he entel, We will note the later than the state of the

The flamboyant spirit of the growing Nazi party now began to attract the varied restless men who were to become its core They included chiefly Alfred Ro senberg, Russian-born engineer and philosopher anti-Jew, and anti Christian Rudolph Hess, Egyptianborn mathematician and geographer, Hermann Goering, Bavarian combat pilot, Gen Erch von Ludendorf, war hero, and Maj Gen Franz von Epp, Bavanan mantry commander All helped to persuade Communist fearing German industrialists to give money to the party, for Hatler assured them that 'we combut only Jewish international capital ' An established Munich journal, Volksscher Beobachter (National Observer) was bought to spread Naza influence. For his mounting ranks of followers Hitler adopted the ancient swastika (hooked cross) as the party emblem and designed the Nazi's red banner with the black on satika He saluted his comrades with raised stiff arm and was

greeted by the word Heal!

From "Beer Halt Putsch" to Prison

By 1923 the Nam's had grown strong enough in Munch to try to sense the government. They started the 'Reer Hall Putsch' "so-called because the Nam bradquarters were in a beer hall. Though added formed you haden lord, it failed! Hitler was convoided of treason and sentenced to five years missed of treason and sentenced to five years missed and government commuted the term to expla months while in prison Hitler, aided by the loyal Raddiph

Hess, began 'Mela Kampf
Emerging from proon in 1924, It there once seam
Emerging from proon in 1924, It there once seam
Nevned destined to failure. The government of
Sumed the Nan party, and only in the reconstruction of the mean
three of the three of the seam of the control of the control

is on top again "
Industrialists Help to Rebuild Nazi Party

He was right The years 1924-28 were prosperous for Germany, and revolutions do not flourish on prosperty From 1925 to 1927 II tiller was even forbidden of speak publicly me tither Bayara or Saxony. But when world wide depression plunged Germany again into poscriy and unemployment the Nazas began to gain votes. By 1930 Hidler hind gained the support of many motisers that his Dr. Gustav Krupp, bend of the Krupp reted works. The mittary caste also supported in Tamily in 1033 the scheming. Nazas succeeded in rassing thur Fuhrer to the chancellorship. In the article in Germany you may trace the steps by which there became dischara scorage of Burrope and War I for does World War. Now old. War. Now old. War. Now old. War. Sevo old.

Behaving himself on the road to world conquest in 1941 Hitler made himself Personal Commander of the Army and in 1942 Supreme War Lord. But on July 20 1944 a group of officers dismayed by his 'intin tive midt my fadures, set off a bomb in his office. He scaped with only a nervous shock.

The Ledend of "Hitler the Superman

Naz propaganda had made of Hitler a symbol of strength and national virtue. He had von German extremibly un 1990 only by the scheming of Nazahenchmen, yet he as a builed at the sided German leder. His un because were closked as "putution." Dospatch had bours and even day of bronding inserts he super level as a run of interer school. He became schooled by young German, a discourable bronding schooled by young German, and the school had bronding the rice fefting mto the hearts and bronns of youth. Coverng Hilder a survivory and cruel character progands built a legend of his avectue habits and sciffers devotion to Germany. Some of the jegend vanisher.

before our era their empire fell and their envilvation passed into oblivion. Only their name remains I, kept in man a memory by scattered references in the Old Testament.

Testament
The story of the Intines,
nearly all that we know of
it has been reconcred noth
in a single lifetime. Most
of it has been precel to
gether since the Breit World
War. Our chief source of
information is the royal
library of 10,000 clay tabtiest discovered in 1006 and



s and a sinping for sheat the modern Armesus a cerving se from a ge of the eld Hittite capital.

later, in the ruins of the ancient Hittite capital Khattusliash, near Bogaz Koi in Turkey, about 90 miles east of Ankara.

These tablets are in cuneiform writing, and most of them, though in Babylonian spelling, are in the Hittite language. For years Hugo Winckler, the German archeologist who made the find, and other scholars labored vainly to get a clue to this un-

known tongue. One day an Austrian professor, Friedrich Hrozny, found, in the same sentence with the Babyloman word-sign for bread, the Hittite word "wadar" spelled out He thought this might be the same as our "water." Other words seemed to have the same roots as the Latin aqua (water), and our word "eat" Working from these

PERFUME JAR



The Hittites were skilful potters. Notice how the lid is fastened to the handle.

translation of the tablets took another ten years. documents, and from the remains of their great forti-

lated to our own. But the

that the Hittites were wild tribesmen when, not long after 3000 B.c., they swept down from the north with

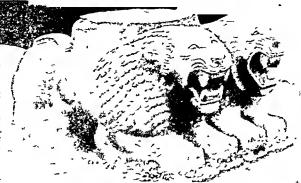
horse and chariot and good bronze daggers. They found it easy to conquer the farmers and herdsmen of Asia Minor, who were skilled only in the arts of peace and had no means of transport faster or more powerful than the donkey. It was almost 2000 B.C., however,

before the Hittite dominions were united into an empire by a king named Labarna. A later king pushed the Hittite power into Syria and Mesopotamia. This empire lasted until 1650 B.c. A still more powerful one arose in 1450.

If the basis of the old empire had been the horse, that of the new was iron. The Hittites appear to have been the first to use iron. For a time their mines on the Black Sea represented the world supply.

Later the Hittite domain broke up into city kingdoms (1050-850 B.C.), and these finally collapsed before the Acheans, who came in a new wave of Indo-European

MASTERPIECE OF HITTITE SCULPTURE



These superh lions, carved into the base of a pillar, were dug np near Antioch In ancient times lions were plentiful in Syria.

slight clues, by 1915 he was able to announce that he had solved the riddle, and that Hittite is an Indo-European language, re-

From these and other fied cities, we now know

EAGLE SEAL



This two-headed eagle was a Hittite religious symbol. The famons Austrian eagle is said to have been derived from this symbol seen on Synan temples during the Crusades.

invasion like that from which the Hittite empire had sprung. The Hittites continued to be famous soldiers. however. Uriah the Hittite was a captain in David's army.

In the fertile fringes of their rugged country the ancient Hittites planted barley, wheat, grapes, and olives Beekeeping was their sugar industry. They raised horses, cattle, sheep, and goats. Their shoes,

turned up like a ski, were invented for use in snow, mountain passes. Loom weights and spindle whorls found in great numbers show that they manufactured cloth. Beautiful cups, jars, and pitchers indicate their interest in graceful and original forms and in convenient contrivances. The Hittites were also famous

workers in metals. Their business methods were Babylonian, and for buying and selling they too used the weighed pieces of silver from which the Greeks got the idea for coins. Caravan routes led from town to town. Big game abounded, and hunting was the sport of king and commoner.

The Hittite state was a military organization. Daily life was closely regulated by law. The price of plowed field and vineyard, of cat-



SECRET NOTE

The Hittites sealed their documents in clay envelopes. This one was a slave contract.

tle and their hides, was fixed. So were the wages of free man and slave. Punishments were mild, but crimes such as murder and theft were made prohibitively expensive by heavy fines.

The Hittite contributed to Western civilization by

acting as middleman for the older cultures of the East. He passed on to the Greeks ideas which influenced their art, their religion, and their business. His mines supplied the iron which put new implements in the hands of the Mediterranean peoples and brought the Bronze Age to a close. Above all, he contributed by holding with a firm hand the bridge between Asia and Europe while Western culture was in its early stages. Asiatic despots might have throttled European civilization in its infancy, had it not been for that thousand years of Hittite supremacy in Asia Minor.

### The CHOICE of a HOBBY

Ship Models—Sailing—Aviation—Stamps—Guns—Fishing—Riding—Wild Life Camping—Pets—Photography—Amateur Science—Radio and Television Handicrafts—Cooking—Magic—Music—Art—and Many Others



you of the most the iting of outdoor sports is riding through tolling wooded country. A on that or good a horse stated to

HOBBIES Wherever you live and whatever your age be sure to choose your own hobby Choose me is creating it is not merely an old Persian proverbit is a guide for the use of a list designed as a spring board for personal adventure

Since The Choice of a Hobby was first published in Compton a Pictured Encyclopedia in 1934 hobby rding has become an uncreasingly popular sport Hobby shows have become regular events and bun dreds of new books relating to hobbies have been published A liberal select on of the most interesting and up-to-date books is included under the 50 different subjects in this list. Boys and girls have shared their experiences Specialists in the various subjects have contr buted ideas and book titles which have been carefully considered I have a hobby of making th ngs in wood confided an eleven yesr-old boy in a New York library I ve made two sail boats from the plans in this book and sa led them on the lake m Central Park I ve made a marionette stage too My father has given me a room in an old office building be owns and I keep all my lumber there and go down to work every Saturday I just love to work down there

When I want to make snything I take it out of my mind was the reply given by a ten year-old boy in Maine when asked if he had a book to show bow to build the things he wanted to make For this boy

one end of the long I ving room of an old Maine farm house had been part to ned off to make a shop. For a long time be built airplaines then he became interested in music. While serving in the navy during the second World War he was assigned to a radar group. He is now engaged in scientific exploration.

Hobby ndag is not a modern sport and of this there are many remarders George Washington kept a dury telling of the hobbes he delighted to ride And until we learned hat Washington hield to do in his spare time how much he cited about horses and riding hant in and fishing much of us were never very interested in reading shout his life. Having a strong entered as Bengama Pranklin had in effectivity as Theolore Rocewell had in sunnals as Franklin Rocewell had in shup and solling and in stamp collecting gives a man his own plays in the memory of any boy or got holding smalls nelected.

It is impossible in limited space to list under midrobal title the many excellent bulletins and pamph lets relating to animals birds insects wild flower agreeding and other subjects which are seven by state and Federal governments. So, it is suggested that readers who desire more material on any subconsult the 1 brigans of public or school libraries concerning available material in pamphlet form

The Merit Badge pamphlets issued by the Boy Scouts of America, the handbook published by Camp Fire Girls, the guides issued by the National Athletic Collegiate Association and published in the American Sports Library (Barnes), and the 'Manual of Ship Model Making' issued by Popular Science Monthly are among those mentioned by librarians who make constant use of them. Basic Science Books in paper covers well illustrated in color are sold at the American Museum of Natural History in New York and at the Chicago Natural History Museum.

#### Ships and Sailing

The Cruising Manual. By Gerry Mefferd. (McGraw, 1941.) Based on the experience of the author, a Des Momes boy, and his partner who made a round-the-world cruise in a Letch they huilt themselves. Written with humor and an understanding most helpful to those contemplating a first season of cruising.

Sailing to Win. By Robert N. Bavier. Illustrated (Dodd, 1947.) Specific information enhanced by many photographs and illustrations on racing rules, starting tactics, etc.

Ships of the U. S. Merchant Marine. By S. Kip Farrington. Illustrated by Jack Coggins. Introduction by Adm. Chester W. Nimitz. (Dutton, 1947.) Informative, nontechnical text. Many illustrations in full color.

The Amateur Seaman. By H. S. "Skipper" Smith Revised edition (Dodd, 1948.) First published in 1936, it is recognized as a hihle for the amateur seaman. Covers everything from choosing a boat to coastal navigation.

The Sailing Ship. By Romola and R. C. Anderson. (Dodd, 1947.) From Egypt to the last days of the sailing ship. Profusely illustrated with drawings in the text and full-page plates. An attractive book.

Handbook of Outboard Motorboating. By Porter Henry

and Bill Allard Illustrated. (McGraw, A compre-1948.) hensive up-to-dateguide to the selection and maintenance of all types of outboard motors. For the novice or the experienced boatman. Gives latest federal and state regulations.

How to Design Small Sailboats. By E. C. Siebert. (Dodd, 1947.) A well-illustrated book dealing with the drafting of working plans for a small sailboat.

Piloting, Seamanship and Small Boat Handling. By Charles F. Chapman. (Motor Boating, 1952.) This classic text for beginners appears in a new edition. Used in the

Power Squadron's elementary classes all over the country. Encyclopedia of Knots and Fancy Rope Work. By Raoul Graumont and John Hensel. 3d edition. (Cornell Maritime Press, 1943) A fascinating large-size book profusely illustrated with every kind of knot and many designs of ornamental rope work. An historical record.

Learning to Sail. By H. A. Calahan. (Macmillan, 1947.) A revised edition of a practical handbook for those who sail small boats. Deals with selection and care of sails and hull, rules of road, piloting, handling the boat, etc.

Oars, Sails and Steam. By Edwin Tunis. (World Pub, 1952). A pictorial history of ships presented in pen and mk drawings of exceptional heauty and authenticity. Reliable descriptive text by the artist-author.

The Boatman's Manual. By Carl D. Lane. Revised edition. (Norton, 1951.) A compact and complete manual on small boats-rowboats, eanoes, sailboats, motorboats and their operation both coastwise and inland. Many clear drawings and good index.

The ABC of Yacht Design. By Charles G. Davis. (Rudder. 1935.) A simple treatise for beginners covering all the

principles of yacht design.

Small Boat Building. By Edwin Monk. (Scrihner, 1934) For the amateur, with 16 modern small boat designs. Row boats, sailboats, outboards, hydroplanes, and a runabout. Construction and detail fully considered in the text and diagrams by a naval architect.

The Ship's Husband. By H. A. Calahan. (Macmillan, 1937) An informative guide to yachtsmen on the care of

their craft.

Sailing Made Easy. By Rufus G. Smith. Photographs by Walter Civardi. (Dodd, 1947.) An all-picture book on sailing with clear reliable captions leading step by step from the first day in a sailboat.

The ABC of Boat Sailing. By Herbert L. Stone. New edition (Dodd, 1946) An excellent book for the beginner, containing many maneuvers illustrated with diagrams.

Ship Model Building

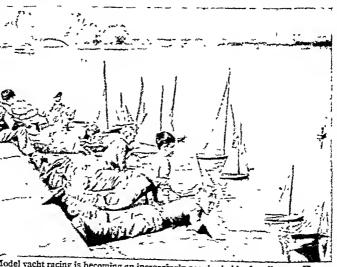
Boatbuilding in Your Own Backyard. By S. S. Rabl. Illustrated (Cornell Maritime Press, 1947.) Written and fully illustrated by a naval architect and huilder for the amateur.

How to Build Small Boats. By Edson I. School. Illutrated. (Barnes, 1952.) Complete plans for building 12 different types of boats-rowboats, outboards, sailboats, and others.

American Ship Models and How to Build Them. By V.R. Grimwood. (Norton, 1943.) The best book in this field, Con-

tains accurate plans and drawings for constructing authentic scale models and numerous sailing vessels from the simple model to the squarerigger. Reading list and glossary.

United States Navy Waterline Models and How to Build Them. By John P Cranwell and Samuel A. Smiley. (Norton. 1947.) Scale models of 20 United States naval vessels ranging from the Mighty Mo of the Pacific fleet to the little destroyer The first Buckley.book of its Lind. Detailed descriptions are fully illustrated.



Model yacht racing is becoming an increasingly popular hobby for all ages. group of boys are launching their boats in the final heat of a race.

Aviation Solo. for Safe What Every Young

Aviator Should Know. By Frederick M. Reeder. Illustrations by Robert C. Osborn. (Harper, 1947.) A readable, re-liable, and amusing book. The author was in charge of the United States Navy's Flight Instruction School. The illustrated in the illustration of trator is known for his Dilbert cartoons. His illustrations form an integral part of the text.

Rockets, Missiles and Space Travel. By Willy Ley. (Viking, 1951.) The future of flight beyond the stratosphere. Illustrated. Rockets and Jets. By Herbert S. Zim. (Harcourt, 1945.) Contains chapters on rockets in battle,



on rigging his model ship this young builder is learn thrill of craftsmanship and the love of great sailing ships rocket motors the goals of interplanatary rockets jets

and near jets etc The Boys Book of Rockets By Raymond F Yates Libustrated (Harper 1947) Facts and pr n iples of rocket com-bustion and propulsion clearly explained. Includes a chapter

on the men behind the rockets The How of the Helicopter By Alfred H Stevens Illustrated by Ernest Stock (Cornell Maratime Press 1916)

Author and artist are experienced fliers Stick and Rudder By Wolfgang Langeweeche-Brandt Blustrated (Whittlesey 1944) An explanation of the art of flying Special append x on the dangers of the air an enalysis

of the airplane a controls Airplane Model Building By Gene Johnson (Cornell Mer time Press 1946) Cleer reliable matrurtions for the beguns: Includes tools and mater als needed to construct sliders and stock models sold scale models fiying models belicopters eto Effectively illustrated

Ronzons Unlimited By S Paul Johnston (Duell 1941) A graphic history of aviation presenting many types of balloons and a rehips ornithopters behoopters sutogeros gyroplanes ghders and sail planes A dramatic presentation
Parachutes By Herbert b Z m (Harcourt 1942) Their value in explorat on fire fighting airmail de

hvery and meteorology—as well as in war Figing Power Written and illustrated by C J Hylander (Macm llan 1943) A bouk about 8 reraft engines and how they work by an instruc-

tor of cadeta Model Aircraft Handbook By William Win ter Illustrated by Paul Plecan and H A Thoma as (Crowell 1943) Covers point by point des gn construct on and flying techs que in authoritative terms

Model Planes for Beginners By H H G! more Revised edition (Harper 1947) Sim placed models of real planes. A very popular small book illustrated with many diagrams and draw ngs by the author

The Aircraft Yearbook Published annually by ancoln Press The official record and reference work on American aviation Contains aviat on

#### chronology and records Stamp Collecting

America e Stamps By Maud and Misks Peter sham (Macmillan 1947) The story of one hun dred years of U S postage stamps dramatically dustrated in color by the authora Picture book size and attractive to boys and gills Philatelie Foundation finds it accurate

The United States Commemorative Stamps of the Twentieth Century By Max G Johl Illustrated Vol 1 1901 1935 Vol II 1935-1947 (Lindquist 1947 ) Drawings made by Carol Seymour A thorough and comprehensive coverage of data pertaining to the commemoratives of the United States. The story of the Armed Porces sames to given in full A unique rork by a United States first-rank philatelist

Scott e Standard Postage Stamp Catalogue Ed ted by Theresa M Clark and Hugh M Clark (Scott) Il atrates and describes every gove ament-issued postage atamp in the world. A new edition is pub-I shed eve 3 year All stamps are sold or traded on the base of catalogue price Ind spensible to

the collector Sanabria e Air Post Catalogue Compiled and edited by Nicolas Sanabria and H M Konwiser (N colas Sanabria Inc 1948)

Colns Com Collecting By Joseph Coffin (Coward McCane 1934) A guidebook for the beginner which is interesting reading Contains a glossary of terms alist of dealers and a b bl ography dealing with numismatica Standard Catalogue of U S Com and Currency Edited by Wayte Raymond (Raymond) From 1652

to the present day Revised annually G ves prices Come of the World Ed ted by Wayte Raymond (Ray mond 1948) Twentieth-century raues A complete list of all the come assued by the countries of the whole world their colonies of dependences There are illustrations of most of the types and the average valuat on among collectors is g ven Swimming

Swimming By Robert J H Kiphuth (Barnes 1942) This book emphasizes competitive awarming from the standpoint of the team. The author is the sw mming coach

at Yale University Learning to Swim in 12 Easy Steps By Adolph Kiefer M Iton Gabrielsen and Bramwell Gabrielsen Illustrated (Prent ce Hall 1951) A practical readable book on the has a principles of swimming Specific direct one for teach one of principles of swittering appeared inter- one for sales ing the crewl back crewl and butterfly strokes. The authors

are well known coaches and teachers of swimming Swimming Fundamentals By Matt Mann and Charles C Free Blustrated (Prentice Hall, 1940) In a mple d rect style this book analyzes strokes and d ving fundamentals

Skating

Roller Skeing By Bob Mart n Illustrated (Barnes 1944) Includes chapters on forward skating backward sketing preparation for ekate-dancing figure skating etc



first hook on the subject. Author's aim is to present instructions for learning to roller skate in the international style.

Maribel Y. Vinson's Primer of Figure Skating. Illustrated. (Whittlesey, 1938.) The ABC of this fascinating sport from the first strokes on the ice to the dances - the waltz, fox trot, tango, etc., usually skated in clubs as

Wings on My Feet. By Sonja Heme (Prentice-Hall, 1940.) Fundamental instructions for skating and school figures, with action pictures. Includes a hiographical sketch of the author.

Standard advanced school

Advanced Figure Skating. By Maribel Y. Vinson. Illustrated. (Whittlesey, 1940) figures, dances, and skating show production. Includes

chapters on the history of skating and the author's personal hackground

Championship Figure Skating. By Gustave Lussi and Maurice Richards. Illustrated (Barnes, 1951.) An informative basic guide for any hoy or girl who has an interest in skating.

Skiing

Swing Into Skiing. By Arnold Fawcus. Illustrated hy Tyler Micoleau. (Harcourt, "The simplest and 1947.) most logical method of skiing that has yet been devised." The author prepared the origiaal draft of the 'American Military Ski Manual'. He is well known in ski circles.

Downhill Skiing. By Otto Laag. Revised edition with new pictures. (Holt, 1946.) "Speed is the thrill, but control is the art." Foreword hy

Hannes Schneider.

The Complete Ski Manual By Eddie Huber and Norman Rogers. Illustrated. (Prentice-Hall, 1946.) "How to begin, how to improve, how to excel." History of skiing, ski making, ski jumping. Glossary of terms.

Skiing Naturally. By Frank Harper. Illustrated. (Wyn, 449.) "Understand every step before trying it" is the

author's advice to the beginner.

Skiing for the Millions. By Frank Harper. Illustrated. (Longmans, 1945.) This is a readable introduction to the greatest winter sport by the author of 'The Military Ski Manual'.

American Skiing. By Otto Eugene Schniebs. Illustrated. (Dutton, 1940.) Describes and demonstrates skiing exercises and terms. It is devoted entirely to American technique and terrain.

Archery

Archery. By Natalie Reichart and Gilman Keasey. Revised edition. (Barnes, 1940) Modern methods in the fundamentals of target archery.

Target Archery. By Robert P. Elmer. (Knopf, 1946.) A new and revised edition of a standard work by the foremost authority in the country. Contains also a history of the sport with all American records.

Fencing

The Art of the Foil. By Luigi Barhasetti. (Dutton, 1932.) "Contains a complete and authoritative presentation of the theory and technique of fencing with a foil, with a short history of fencing.

Fencing. By Joseph Vince. Illustrated. (Barnes, 1940.) Combines the best features of the French and Italian schools in foil, and the Hungarian-Italian saher school with the author's own methods in teaching the use of the foil, the épée, and the saher. Brief history of fencing.

Guns and Shooting

Rifle Marksmanship. By William L. Stepheas. (Barnes, 1941.) For beginners and for marksmen eadeavoring to improve their score.

The Amateur Gun Craftsman. By James V. Howe. Illutrated. (Funk, 1938.) A practical book for amateurs who work with guns and keep them in prime condition.

Gun Collecting. By Charles E. Chapel. Illustrated (Coward-McCann, 1939.) Tells what types of guns are valunble, how to arrange, repair and photograph them. Re-

veals the story behind the guns. The author is an internationally recognized authority on arms history.

The Gun Collector's Handbook of Values. By Charles E. Chapel. Illustrated. (Cownrd-McCann, 1947.) Describes about 2,000 American and foreign firearms and assigns values to them.

Fishing

Boys' Guide to Fishing, By K. and E. E. Morton. Illustrated. (Greenberg, 1947) Answers any boy's questions about salt-water fish, freshwater fish, hait and tackle Reliable information. Many pietures. Attractive format

Streamside Guide to Naturals and Their Imitations By Art Flick. Illustrated (Putnam, 1947.) A pocketsized book hased on long, intensive study of flies. Colored

plates of May flies. Western Trout. By Syl MacDowell. Illustrated. (Knopf, 1948.) Includes every species of trout to be found in western waters from the rare golden to the steelhead. An illuminating book for any reader.

Just Fishing. By Ray Berg-

man. (Knopf, 1943.) "Covers all the eastern fresh-water game fish with particularly fine chapters on trout, bass, pike, and pickerel fishing, land-locked salmon, lake trout. The author is an expert and the book is extremely well written."

Field Book of Fresh-Water Angling. By John Alden Knight. (Putnam, 1944.) A pocket-size book dealing with angling methods, the purchase and care of tackle, etc.

The Complete Fly Tier. By Reuben R. Cross. (Dodd, 1950.) Tells how to make your own dry flies, wet flies. nymphs, and huck tails.

Fly Tying. By William Bayard Sturgis. (Scrihner, 1940) "Deals with brook trout, brown trout, steelhead, and salmon; wet flies, dry flies, hair-wing flies, nymphs, and the latest patterns in use from the East to the West Coast."

Salt Water Fishing. By Van Campen Heilner. (Knopf. 1943.) Tells where to go, at what season, and what tackle to use for each fish. Illustrated in color by W. G. Lawrence.

Golf. By Patty Berg and Mark Cox. Illustrated (Barnes, 1950.) Describes by pictures and text the build-up of Patty Berg's championship playing.

Championship Golf. By Mildred "Babe" Didriksen Zahar ias. Illustrated. (Barnes, 1948.) Outlines the practice and procedure for a sound golf game. A personal approach by the winner of the Women's Championships of both the United States and Britain. Excellent photographs.



The grace and skill of this lovely figure skater makes her a champion in this spectacular winter sport.

Power Golf By Ben Hogan Fully illustrated (Barnes 1948 ) For both novice and expert

Tennis Made Easy By Lloyd Budge Illustrated (Barnes 1945) A simple direct method of learning the lundamentals of the game Introduction by Don Budge How to Win at Tennis By Jack Kramer (Prentice-Hall

1950) By the Wimbledon champion of 1947 How to Play Better Tennis By Will am T Tilden Mustrated ( mon & Schuster 1900) The author is a

champ on with a world record Tean's By Helen Hull Jacobs Illustrated (Barnes 1941) Clear d rections based on the experience of a cham

Track and Field Sports Track and Pield By Ray Conger Illustrated (Bar et

pon player

1939 ) A famous Olymp o star and well known couch discusses track and h ld fundamentals Freid Horkey for Girls By Joseph ne Lees Illustrated (Barnes 1942) Individual play in relation to team play

For beginners and onches Championship Technique in Track and Field By Dean B Cromwell and A P Wesson Ellustrated (Wh tilesey 1949) A book for athletic conches and apectators Emphas ses that

each athlete has an andaviduel etyle Pop Warner a Book for Boys By G 5 Warner (Dodd 1945) Conta ne chapters on baseball lootball

track and field athletics and basketball A popular book for younger boys

Baseboll Buschall for Everyone By Joe D Maggio with an Ad vecy Board of Experts (including Frankle Fresh Bill Dekey Carl Hubbell Art Flatcher) (Whittlessy 1949) A treasury of baseball lore and instruction for fans and players Illustrated with line drawings and photographs A reveal ng story of the few orate national same by is most

outstand ag exponent Rendable end informative
Besshall By John W Coombs New revised edition
litustrated (Prent ce-Hall 1981) Individual play and team stretegy by the baseball coach of Duke University

Instructions to scorers have been added Includes official rules of avoring for sand lots or b z les gues 100 situatrations Story of Baseball By John Durant (Hastrogs House

1947 ) Told in pictures with brief feet Beschell By Robert Sm th Drewngs by Russ HR Gale (Sumon & Schuster 1347) An historical narrative of the game the men who play it and its place in Amer can I le Do You Know Your Baseball? By B Il Brandt (Barnes 1957) Baseball history in question form. The 50 butters argumouts proved by the author from baseball annels. All the records refer to the National League and the American

League How to Pitch By Bob Feller Illustrated (Barnes 1948) Fandamental Handball By Bernath E Philips Illustrated Revised adition (Barnes 1940) Includes a section on the one wall game and a synops a of the four wall softball

handball rules A top cal b bhograpy Football How to Play Pootball By Lynn Waldorf Illustrated (Prentice-Hall 1942) The pr nc ples of successful football

for the player and for the spectator Presented by the former head coach of Northwastern University Championship Football By Dana & Bible (Prentice-

Hall 1947 ) A gu de for player coach and fan Chapters on watching football afor ng, etc Socce: By Samuel Fraich Illustrated (Barnes 1945) description of the game with directions for playing it

Scare records Football By William Glenn K llinger Elustrated (Barnes

1939) For the player and the spectator Fully dissersted with I ne drawings and photographs Football Techniques Illustrated By Jin Moore Illus-

trated by Tyler Micoleau (Barnes 1951) Br of clear instructions for the beginning player and the new coach The diastrat our are a special feature of the book

Football Kicking Techniques. By Kenneth E. Strong and Lun'l E. Brodbeck. (McGraw 1900). A player's guide to better punting place kicking and drop kicking Foreword by Grantland R ce

Bankethall

Winning Basketball By Nat Holman Illustrated (Se bner 1932) The complete manual for the player and the Baskethall Blustrated By Howard A Hobson (Barnes

1949) A bas e book for coaches as well as a reliable terribook for place a Fully illustrated Winning Basketball Plays Edited by Clair Bee (Barnes.

1950) Tacts s and atrategy presented in 300 championsh D play? Basketball for Girls By Wilhelmine E Me sancr and

Ehnsbeth Y Meyers Revised ed t on Illustrated (Barnes 1950) Boxing and Wreatling

Boxing By Edwin & Haislet Illustrated (Barnes 1940) The techniques and skills of box ng clearly presented Judo By T Shoan Kuwash ma Enlarged and revised

ed tion Illustrated (Prentice-Hall 1943) A book on 1 units; very popular among boys of junior h ab-school ago Josephsa By Frederick Paul Lowell (Barnes 1947) The art of unarmed self-defense Illustrated w the scellent photo-

graphs Garnes The Game Book By Margaret E Mulac Illustrated (Harper 1946) Includes many party games and ideas card

tricks carn vals. Also special programs water games and suggest one for equ pping recreat on centers Games for Younger Children By Marian A Webb (Mor.

row 1947) Abun fred games for part ca Town and Country Games By Robort North Illustrated by Garry MacKenzie (Crowell 1947 ) Two hundred games lor o tdrors and indoors singing games my tery starts ridd es etc. Attractive format. For younger children

Fun with Puzzles By Joseph Leeming Illustrated by Jesus Robinson (Lippincott 1916) A book for informal put-together puszles Anagratus and word puzzles Horses and Riding

Heads Up-Heels Down By C W Anderson Illustrated (Marm llan 1944) A handbook of horsemanship and riding

cuarm son 1944; A anacoos of opissmanship and riding focular the care and banding of a horse by the novice who must be his own stable boy. Huntrated by the author Repus By Bernard S Mason Huntrated (Barnet 1949) Chapters on ropes and roping rope as name trick knote with a larget rogery exh bitions

Richag By Benjama Lewis (Garden City 1928) Fun on Horseback By Ma garet Cebell Self Illustrated (Barnes 1945) Games and grinkhana Covers break ng and

IDALIES 1883) CAMES AND INTERNANDA COVETS OF EAR IN AND TAR IN 1986 COLIS USER! IN CHIEF CONTROL TO AND ADMIN OF HORSES BY MATGERIA HEATY INVISITED AND Wesley Dumin (Rand 1981) Excellent deverptive text COVETING MANY familiar brends of horses. Full page illustrations in color and energy marginal drawings Theroughbreds By C W Anderson (Marciallan 1942)

The value of good breed ng shown in sketches of ind vidual horses Deta led drawings show horses in action and the points by which they are judged

The Horse His Gast, Points and Conformat on By Paul Brown (beribner 1943) Smpla direct text with many

pene I drawings Horses Their Selection Care and Handling By Mar garet Cabell Self Illustrated (Barnes 1943) The results

of 30 years experience Farmi at breeds of horses feeding or of years experience. From it overess to move tending groom ing costs. Includes chapters on first aid the show ring set. The author has also written. Teaching the Young to Ride. as excellent book for children.

The Art of Riding By Leut Col M F McTaggart (Scribner 1936) A textbook for bennners and others Part I contains a clear exposit on of the forward seat in jump ng Part II novers care and tra n ng a lments stabling etc Fuely alustrated

Horsemanship. By Margaret Cahell Self. Illustrated with photographs and with diagrams and drawings by Sarah Mason. (Barnes, 1952.) Covers methods of training the horse and the rider and the progressive steps from elementary to advanced jumping. Fritz Steckin, trainer and rider of Olympic horses, contributes the chapter on advanced dre-sage and haute école. The appendix, glossary, and bibliography are of special value.

Dogs

So You're Going to Get a Puppy. By Col. S. St. P. Meek. (Knopf, 1947.) A dog lover's handbook hased on long personal experience. Readable at any age. Answers many everyday questions.

Know Your Dog. By John H. Hickey and P A. Beach. Illustrated. (Harper, 1947.) Includes spaniels, setters, sheep dogs, sled dogs and other breeds. Chapters on care and training. Also on hench shows, field trials, and classification of dogs in the United States, England, France, Spain, and Germany.



To get fun and affection from a pet, its owner must carefully train it and care for it regularly.

How to Raise a Dog in the City and the Suhurbs. By Dr. James R. Kinney and Ann Honeycutt. Illustrated by James Thurher. (Simon and Schuster, 1947.) First published in 1933, this book has been a very popular one. Dr. Kinney, the chief veterinarian of the Ellin Speyer Prince Hospital, gives specific information applying to all hreeds and answers many questions. Delightful illustrations.

Training You to Train Your Dog. By Blanche Saunders. Illustrated. (Doubleday, 1946.) A new approach to training dogs in obedience as companion dogs and as utility dogs.

The Observer's Book of Dogs. By Clifford L. B. Huhhard. Illustrated. (Warne, 1946) A pocket-size book dealing with 300 breeds and varieties.

The Complete Dog Book. The American Kennel Club. Illustrated. New and revised edition. (Garden City, 1951.) Covers the care, handling, and feeding of dogs. Discusses hreeds and standards.

Drawing Dogs. By Diana Thorne. Introduction by Henry B. Quinan. (Studio, 1940.) A picture book of living portraits for dog lovers and au informative book for the artist who wants to know how to draw dogs. By a widely known artist.

The Dog in Training. By Josef Weber. Illustrated (Whittlesey, 1939.) The author's knowledge of the subject stems from personal experience in the methods of training in international schools. He is an outstanding dog trainer and the founder of the Obedience Tests. Includes chapters on the dogs in the army, leading the blind, and protection.

Care of the Dog. By Will Judy. 4th edition. Illustrated (Judy, 1948.) The world seen through a dog's eyes. A very human appeal.

Dog Training Made Easy. By William Cary Duncan. (Little, 1940.) A dog lover who wrote this readable book believes that the dog in the home should be well trained.

The Cocker Spaniel. By Ella B. Moffit. (Judd, 1946) "Complete information on history, development, characteristics, standards for field and hench. Practical advice on raising, training, and handling."

Our Dogs. By C. E. Harbison. New and revised edition (Judd, 1935.) "An outstanding book on practical dog keeping for the novice, with many suggestions for the expert as

Know Your Cat. By John H. Hickey and Priseilla Beach. Illustrated. (Harper, 1946.) Tells how to identify different hreeds, how to feed and care for cats and kittens. Includes ehapters on shows and standards for pedigreed cats in the United States and Great Britain.

How to Live with a Cat. By Margaret Cooper Gay. Illutrated by Roberta MneDonald. (Simon & Schuster, 1946) An entertaining book as well as a practical one giving all the details of good care. Includes a chapter on cat stories.

Drawing a Cat. By Clare Turlay Newberry. (Studio, 1940.) "Cats do not pose for the artist," says this artist of delightful picture books whose insight into the personality of eats is noted by Thomas Craven in his introduction.

The Care and Handling of Cats. By Doris Bryant. Illutrated. (Ives Washburn, 1944.) A unique manual for modern eat owners by a widely known specialist in the care of pet cats. Covers America's cats, also Siamese cats.

Cats and All About Them. By L. H. Fairehild and Helen G. Fairchild. Illustrated. (Judd, 1947.) The training and habits of cats simply and competently treated. Covers feeding, grooming, registering, and showing.

Rahhits. By Herbert S. Zim. Pictures by Joy Buba (Morrow, 1948.) Delightful pietures in color illustrate a practical and simple text about rabbits and rabbit raising for younger children.

Turtles. By W. S. Broason. (Harcourt, 1945) What kinds of turtles make the best pets? This book answers that question and many more. For younger children-

Book of Nature Hohhies. By Ted Pettit. Illustrated by Don Ross. (Didier, 1947.) Contains suggestions for bird watching, wild flower gardening, care of wild animal pets and other nature activities. Excellent directions for setting up hohhies in limited space.

All Ahout Pets. By Margery Williams Bianco. Illustrated from photographs with decorations by Grace Gilkison (Macmillan, 1929.) A readable and reliable little book about the care of rabhits, mice, guinea pigs, hirds, turtles, etc For children under ten years old.

Fishes

Fishes and Shells of the Pacific World. By John T. Nichols and Paul Bartsch. Illustrated. (Macmillan, 1945) The first book on fishes and shells of the Pacific area. The authors are from the American Museum of Natural History and the Smithsonian Institution. The outline drawings of fishes are very effective.

Goldfish. By Herbert S. Zim. Pictures by Joy Bubs. (Morrow, 1947.) Answers the questions of young goldfish owners with clear scientific information and many pictures in color and hlack and white.

An Aquarium Book for Boys and Girls. By Alfred Morgan Illustrated. (Scribner, 1936.) Tells how to take care of an squarium and gives interesting facts about fish from and turtles

Eastic Aquarium Flahee By William T tones trated (Innes 1952) A comprehensive and beautiful book lor the identification of species. The photographic illustrations in color were made by the author who is the editor

ol Aquartum

North American Game Fixhes By Francesca La Monte Hustrated by Janet Roembild (Doubleday 1945) Game fishes of ponds brooks rivers and seas presented nontech neally by the associate curntor of fishes at the American Mu seum of Natural History A small book with color plates Goldfish Varieties and Weter Gardens By William Thren ton Innes Illustrated (Innes 1947) The latest edition of this reliable and fully illustrated guids to goldheb and

squara Contains new meterial on water gardens with water 13 es un color

Fishes Their Journeys, and Migrations By Louis Roule Introduction by William Beebe (Norton 1933) An unusual book which presents one of the most interesting phases

Tropical Fishes as Pets By Christopher W Coates Revised edition Illustrated (Laveright 1950) A practical reliable book about how to raise and care for tropical fish in a home aquartum. The author is curator of the New York Aquarium The photographs by 8 C Dunton

raclude several in color

Tropical Fish as a Hobby By Herbert R Azeltod Blutrated (McGraw 1952) A well-organized readable book Tells how fish get their names and includes hvely discussions of individual fish. Reference about hists popular and scien

tific names Excellent bibliographies

The Seashore Second Shore By Clerence John Hylander (Macmillan 1950 | A clear ersent fit explanation with dre wings and photographs that stimulate curiosity and interest in marac life Floride See Shells By Berthe D E Akirsh and Eibel Snyder (Houghton 1935) Contains chapters on the romence of the beaches the history of molkisks atc. Thera are some very practical suggestions for collecting and

mounting shells A Field Guids to the Shells of Our Adantic Coast By

Parry A Morris Illustrated (Houghton 1947) The range of this book is from Maine to Florida. The clear descriptons of size distribution color and distinctive markings with natural-color photographs make identification easy

Lets Go to the Seashore By Harriet E Huntington (Doubleday 1941) Starfish and sea urchins perswinkles and crobs presented in a picture book for young children

The Seashare Book for Children. By Thornton Burgess (Lattle 1929) The most complete book of seachers his for young children The color plates are admirable and there is an appendix for the identification of specimens with h is useful at any age

West Coast Shells By Jonah Keep (Stanford Davy Press 1935) A description in familiar terms of the principal marine fresh water and land molivaks of the Unried States British Columbia and Alaska found west of the Sierras Birde

Birds of America Edited by T Gilbert Pearson Illustrated (Garden City 1935 ) A large-use authoritative book on the birds of North America written and illustrated by lead ng ormthologists and artists. Accurate smentific data Illumnating accounts of characteristics. Hundreds of line drawings and photographs and over 100 full page color

pastes from paintings by Louis Agess a Fuertes

Birds in Their Homes By Add son Wabb Pictures by Sabra Mallett Kimball (Garden City 1947) A most at-tractive book for younger children Information reliable

Mustrations in color Starlings Written and illustrated by W E Brunson (Mercourt 1948) Contains a wealth of bird fore in true-to-

the pictures and simple text for younger children Audubon Bird Guide Egstern Land Birds By Richard H Pough Ill istrated in color by Don Eckelberry (Donbleday,

1946) Contains a good bibliography

Return History of the Birds of Eastern and Central Parth America By Edward H Porbush Revised and abridged with the addition or more than 100 species by John R. May Illustrated in color by Louis Agassiz Fuertes Allan Brooks and Roger Tory Paterson (Houghton 1939) The life history and an arcurate description of every bird to be found east of the Dakotas Nabraska and Kansas Includes Flor-

tda and Canada Book of the Pigeon By Carl A Naether Illustrated Third edition (Meksy 1914) Up-to-date information on every phase of pageon keeping. Includes rare fore on vevieties racing pigeous and an interesting bibliography of

p geon hterstore Birds By Herbert S &im and Ira N Gabrielson lilustested by James Gordon Irving (Simon & Schuster 1949) A pocket guide to American birds Includes range maps

A Reid Guide to Birds By Roger T Peterson (Hough ton 1947) Revised edition An interesting way of looking at leads by the greentation of their cofor value as they appear in fight. Gives fieldmarks of all species found east

of the Rockies New plates and information included A Field Guide to Western Birds By Roger T Peterson (Houghton 1941 ) Covers the Rocky Mountain states the

Pacific etates the Pacific Northwest and Southwest, em phasizing dist neurabing characteristics of the hirds when seen et a d stance

Femiliar Birds of the Pecific Southwest By Florence V V Dickey (Stanford Univ Press 1935)
Birds of the Ocean a Handbook for Voyagors By W B

Alexender (Putnam 1928) Notes on hebits foods and migration of sea birds An Intraduction to Birds By John Kieran Illustrated

by Don Eckelberry (Garden City 1950) A neture lover mystes friendly acquaintance with the more nommon of the native birds of North America Picture bonk size illustrations are in full color

Bird Guide Land Birds Seet of the Rockies By C A Reed (Doubleday 1926) Packet-sized bonk with colored illustrations haref description of habits songs nests range etc Identification key by conspicuous markings Reptiles

The Repulse of North America By Raymond L Ditmare Bluetrated (Doubleday 1936) The crocod hans I seeds enakes turiles and tortoises in the United States and northern Maxico A revision and extension of 'The Reptile Book published more than 40 years ago. Many species have been added also now other plates and photographs from I fe

A Field Book of Worth American Snakes By Raymond L Dames I just ated. (Doubleday 1946) Snakes of northeastern southeastern and western sections

Snakes of the World By Raymond L Ditmara With Blustrations from his (Macmilan 1938) A book largely based on questions about snakes. With the remarkable photography are authentic and interesting descriptive notes Spakes Alva and How They Live By Chifford H Pone Illustrated with photographa (Viking 1946) Contains an illustrated key for the identification of the anakea of the

United States A fascinating book Geology

Mmerals By Herbert S Z m and Eluabeth K Cooper (Harcourt 1943) Their identification uses and how to collect them A book of itving interest effectively illustrated

The Field Book of Cammon Rocks and Minerals Frederic B Loomis (Putnam 1943) Contains colored plates and many allustrations from photographs taken by the author to aid in identification The Earth, Our Ever Changing Planet By Chester A

Reeds. Blustrated (University Society 1935) This book contains chapters on historical resums of goology the hthosphere earthquakes volcanoes eto The author is curator of geology at the American Museum of Natural

History Earth's Adventures The Story of Geology for Young People By Carroll Lane Fenton Blustrated (Day 1942) Propis By Carron American August (Day 1942)
A mentechnical geology by a well known specialist contains
an excellent up-to-date bibliography Along the Hill is a pocket-size book about eommon roeks, minerals, and fossils by the same author

Fossils. By Richard Swann Lull Illustrated (University Society, 1931.) "What they tell us of plants and animals of the past" The director of Peabody Museum of Yale University gives a remarkably clear presentation for the reader without technical background

#### Butterflies and Bugs

Grass Roots Jungles. By Edwin Way Teale Illustrated Revised edition (Dodd, 1944) Based on the author's discoveries in his backyard. A popular book with older boys



These children are learning more about their hobby of collecting hutterflies by examming wings under a microscope.

American Butterflies and Moths. By Cecile Hulse Matsehat Illustrated by Rudolph Freund (Random, 1942) Excellent for identification and study of species Authentic drawings in color. An attractive book.

The Grasshopper Book. By Wilfrid S. Bronson. Illustrated by the author. (Harcourt, 1943) Includes chapters on erickets, katydids, and the praying mantis. Incidents drawn from the author's observation of grasshoppers and erickets kept in cages will fascinate young children.

The Butterfly Book. By W. J. Holland. (Doubleday, 1947.) A popular guide to the butterflies of North America, first published in 1907. Full-page color plates.

Insects. By Herhert S Zim and Charles Cottam. Illustrated by James Gordon Irving (Simon & Schuster, 1951.)
Pocket-size guide to familiar American insects Contains a key to insect group. Includes butterflies and moths

Field Book of Insects. By Frank E. Lutz (Putnam, 1935) This is not intended for children but it is nevertheless a valuable handbook for amateur entomologists young and old. This author's 'A Lot of Insects' (Putnam, 1941) will attract younger children.

Fahre's Book of Insects. Retold from Alexander Terveira de Mattos' translation of Fabre's 'Souvenirs Entomologiques' hy Mrs Rodolph Stawell Illustrated by E. J. Detmold. (Dodd, 1921) The beautiful color plates for this book and for 'Insect Adventures', which is also retold from 'Souvenirs Entomologiques', give it a unique place

### Wild Flowers, Ferns, and Trees

Wild-Flower Guide. Northeastern and Midland United States. By Edgar T. Wherry. Illustrated by Tabea Hofmann. (Doubleday, 1948.) Technically accurate but easy to follow. Suggests how plants can be cultivated. An appendix classifies flowers according to color and also introduces wild flowers of other countries. The author is profesor of botany at the University of Pennsylvania

Trees of the Eastern United States and Canada. By William M Harlow Illustrated. (Whittlesey, 1942) Wooderaft and wildlife uses of trees are given special attention in this attractive book. Many illustrations are in color

Plants. By Herbert S. Zim. Illustrated by J. W. Brainerd (Harcourt. 1947) A guide to plant hobbies. Gives a survey of the entire plant world by an amateur in this field, who is well known for his books of science. The book has a list of places in the United States which are of particular

interest to the plant enthusiast. It is easy to read and contains excellent reading lists for the various subjects.

Desert Parade. By William H. Carr Illustrated by Marvin H. Frost (Ving, 1947.) This valuable, practical guide to the plants and wildlife of the Southwest is illustrated with unusual photographs by the author, who was the former associate curator of the American Museum of Natural Histon and is now president of Arizona Wild-Life Federation.

Indian Harvest. By Jannette Mar Lucas Illustrated by Helene Carter (Lippincott, 1945) The wild food plants of America elearly described and effectively illustrated.

Field Book of Western Wild Flowers By Margaret Arinstrong in collaboration with J. J. Thornber. Plates in color, black, and white (Putnam, 1915) The common wild flowers growing west of the Rockies are pictured and described

Flowers of Coast and Sierra. By E. G. Clements. (Wilson, 1928) Popular account of most common flowers of the Pacific coast from Southern Californa to Washington.

An Introduction to Wild Flowers. By John Kieran. Illustrated by Tabea Hof-

mann (Doubleday, 1952.) Wild flowers presented in the approximate order in which they come into bloom by the same nature lover who wrote 'An Introduction to Birds'. The illustrations in color are exceptionally good. The artist is well known for her authentic drawings and paintings of flowers.

Field Book of American Wild Flowers. By F. Schuller Mathews. Colored plates and illustrations in pen and interpretations. Per ed., 1929.) Classified by month with clear descriptions of the characters and habits of flowers, and references to insects which help fertilize them. A standard work with good illustrations.

Field Book of American Trees and Shrubs. By F. Schuyler Mathews (Putnam, 1915) Standard guide to trees

Descriptions and maps show their general distribution
Trees of California. By W. L. Jepson. (Sather Gate
Book Shop, Berkeley, Calif., 1923.) "The best book for
California in our collection."—Los Angeles Public Library
Flowers of Parisis.

Flowers of Prairie and Woodland. By Edith S Clement Illustrated with color plates. (H. W. Wilson Co., 1947) Life-size pictures of the flowers in color. Many of the paintings were made on the spot.

A First Book of Tree Identification. By Matilda Rogers Photographs by Wynn Hammer. (Random, 1951.) Excellent photographs of the branches and leaves of 31 common varieties with clear descriptive text. Includes chapter on the barks of various trees

American Trees. By R. T. Limbach. Introduction by T. H. Everett. (Random, 1942) Picture-book size. Contains 55 different kinds of trees. Authentic drawings and paintings in color by the author-artist.

The Complete Guide to North American Trees. By C. C Curtis and S. C. Bausor. New Home Library (Garden City. : , . ,

1943) A well-arrenged guide for the alentification of trees m which the leaf is the principal key to recognition

Gardene American Garden Flowers By Gladys Pratt Fround Austrated by Rudolf Freund (Random 1943) Readable

description of 69 familiar garden flowers ware and shrubs secompanied by full page color plates Garden Flowers in Color By Damel J Foley (Mac

milan, 1945) A prefure encyclopedia of flowers

In Yords and Gardens By Morgaret Warms Buck (Abargion Cokerbury 1952 ) Based on the author-ertist a sear-round observation of the birds butterflies from turtles flowers trees and vegetables a her own garden and thread by the American Museum of Natural History for sutbentuny of text and pictures. Planned as interest

younger children Spice and Scent Written and illustrated by Lee Mar l (Coward McCann 1943) Herbs in fact and fin y An attractive little book in which receiving punits lavender

and other herbs ere to be found

Where Did Your Garden Grow? By Januaria May Launa Mostrations by Helene Carter (Lappinuott 1939) All the flowers in your garden were onto mild flowers in some part of the world. The maps and p ctures in color show them in their original habitat and on their travels

A Book of Garden Flowers By Margaret Mchenny and Duth P Johnston (Macmi last 1941) Paintings in color of 25 garden flowers accompan ed by brief text in nontechnical

tenguage Plants in the City By Herman and Nina Schneider likatested by Cynthia Koshier (Day 1961) Indoor gardening Clear information on city ways of city plants

Siper mente with beans and seeds Garden Guide The Amateur Gardener's Randbook Ed sted by A T De La Mare 7th edition Rewritten and greatly enlarged (Dodd 1947) A comprehensive end rehable book dealing with the flowers fruits vegetables the bees birds and fish of the Northern and Middle States and

Caldorma Arrangement of Flowers By Mrs Weiter R Rine ("embaer 1940 ) Des la with three schools of flower arrangement also d scusses table decorations and flower contamera Fine uncolored illustrations

Peture Primer of Indoor Gardening By Margaret O Coldsmith Hugersted by Herrie Wood (Houghton 1946) The science and art of indoor gardens A most staractive book in full color

Astronomy

Picture Book of Astronomy By Jecome S Meyer libretrated by Richard Floethe (Lothrop 1945) A fascingting book for any sage but of spec al saterest to the younger children

Sun, Moon and Stars By W T Skilling and R S Rich ardson Illustrated (Whittlesey 1946) Covers the planets the stars, and devotes a section to Astronomers and Others tonce Designed for begunners. The book is written in on

informal style attractive to older boys and gels Dr Richardson is at Mount Wilson Observatory Astronomy from a Dipper By Eliot C Clarke tHough ton 1909) The sumplest and clearest book on astronouty Charts supplied by the author make it easy to find the pen

tion of the other constellations from the B E Dipper Introducing the Constellations By Hobert H Baker (Viking 1937) A companion volume to When the Stars

Come Out in which the whole pageant of the skeep in preented with sim lar pictorial features

The Stars for Sam By William Maxwell Reed Edited by Charles E St. John Decurations by Karl Moseley (Harcourt 1941) An astronomy which rests on new con deptions of time space and matter treated with clarity and magnation Contains a chapter on E netern For boys and pris of juntor high school age

When the Stars Come Out By Robert Baker Illustrated with photographs maps end charts Decorations by Born Artrybasheff (Viking 1934) The arresting character of its pectornal features and the recent developments covered give the book a special cisim in routing genuine interest in autronomy among older girls and boye Includes a description of the Adles Planetarium

Science Everyday Weather and How it Works By Herman Schneider Ellustrated by Jeanne Bendick (Whittlesey 1951 ) Tells how to read weather maps and how to make a

home weather forerasting station. Answers many questions Boy o Book of Modern Science By S M Jennings Phinstested by I N Stemberg (World Pub 1971) Includes nucleus finston un roscopes Diesel engines A comprehenrive book for older boys

Boys Book of Science and Construction By Alfred P Morgan Elfustrated New and revised edition (Lothrop 1948 : Scientific facts and catural phenomena including rocket a let motore Dienel engines redar and atom cenergy Many experiments

Chemistry

adventure

Open Door to Chemistry By John L. Horning and George C McGina s Elestrated by Helen Armstrong (Appleton 1916 | Taret steps in chemistry with a mple experiments

Experiments in Science By Nelson F Beeler and Frank tea M Brantey Illustrated by Ruth Beck (Crowell 194") Suple experiments. Directions for making a periscope a ma we etc clearly set forth by two teachers in echools for

Fun with Chemistry By Mas and Ira Freeman (Random 1914 ) S puble experienchte

First Champetry Book for Boys and Girls By Alfred P. Morgan Bustented by Bradford Babb tt and Torry amith (her have 1950) Describes 64 different experiments with clear directions for performing them and a list of the

chemicals required. Chemistry as a hobby is filled with Physics

Pictare Book of Molecules and Atoms By Jerome S Meser Blustcated by R chard Floethe (Lothrop 1947) The fundamentals of modern stome sevence in clear language much interpretative limitations in color Will simulate the imag nation of adults as well as that of children A look

which naturalises ; byeice as a subject in sarly childhood Esplanting the Atom Dy Sel & Heth! Illustrated (Sik ing 1947) Base physics for the laymon showing the development as physics during the past fifty yee s A Shall

readable book with supplies hackground for the problems of stemps ereczy Young People's Book of Atomic Energy By Robert D Potter Illustrated (Dodd 1948)

Atom to for the Millions By Marwell L Exhipoff and Hyman Ruchles Blustrated (Wh ttlasey 1947) Clear montechancel statement of basic principles behind the driver opment of atomic energy Traces this development from the beginnings

Isvatation to Experiment. By Ira M Freeman Illustrated by Mas and Ira Freeman (Dutton 1940) A nontechnical presentation of physics in concine form ma pia

Physics Tells Why By Overton Luhr Illustrated by Rad C Schroedt Ray sed edition (Ronald 1946) By the comfunction of amounted illustrations and clear statement the author has brought to the ununitated the prin caples of radio television air conditioning ultraviolet tars Arms and comus says A que supplement adds to the interest of this book.

Rempose Through Physics By Otto Willi Gail Illustrated by Hermann Blank (Amopi 1934) The most obvious facts in physics freated in an ent rely logical sequence A first book. The clever drawings in color are based on things svery child should i now

Physics of Today By J A Clark and others (Houghton 1943) The fundamental laws and principles of physics are clearly set forth The experiments are illustrated by MARTA C PELAGE

Adventures with a Microscope. By Richard Headstrom. (Lippincott, 1941.) A series of projects in the first use of

the microscope by an experienced scientist

Working with the Microscope. By Julian D Corrington. (Wbittlesey, 1941.) In a series of exercises in the mounting of materials for observation under the microscope explanations are made as simple as possible Designed for amateurs working alone or in a club. Weil indexed. Gives sources of supplies. Reference tables.

Fun with Your Microscope. By Raymond F. Yates.

(Appleton, 1943.)

Photography

Fun with Your Camera. By Jacob Deschin. (Whittlesey. 1947.) For camera enthusiasts. Contains information on prize contests and exhibitions. Lists annual contests for professional and amateur.

Pictorial Continuity. By Arthur L. Gaskill and D A. Englander. (Duell, 1947.) A clear, technical yet readable introduction to making movies. For the teen-age and ama-

Table-top Photography. By Henry G. Russell. (Transatlantic Arts, 1947.) How to create a scene and photograph it. Of special interest to camera cluhs.

Flash Photography. By Gordon Parks. (Grosset, 1947.) A detailed and well-illustrated account of each phase of

flash photography.

Photography for All. By Duane Featherstonhaugh. (Barnes & Noble, 1947.) A most complete book for the amateur which explains in a clear manner the many tricks hy which the beginner will always get his picture.

A Guide to Better Photography. By Bereasce Abbott. Illustrated. (Crown, 1941.) One of the foremost photograpbers of the country shows how to make hetter photographs. The book covers all the subjects and techniques from choosing your eamera to documentary and exhibition work. Unusual photographic illustrations from the work of masters of the art. A thrilling hook.

This Is Photography. By Thomas H. Miller and Wyatt Brummitt. Illustrated. (Garden City, 1946.) The authors are expert practical photographers of the Eastman Kodak Company. Readable and informed. Includes advice on

choosing equipment, color photography, etc.

Photography for Teen-Agers. By Lucile Rohertson Marshall. Illustrated. (Prentice-Hall, 1951.) Concise reliable information presented in a lively form covering every phase from the hox camera to flash hulhs, movie making, and the use of color films.

The Fun of Photography. By Mario and Mabel Scacheri. (Harcourt, 1938.) Explains the principles of successful photography with emphasis on the mind behind the lens; 375 half-tone illustrations. Brilliant and instructive.

Electricity

Electronics for Young People. Written and illustrated by Jeanne Bendick. (Whittlesey, 1947.) An introduction to atomic theory and modern power. An earlier edition was called 'Electronics for Boys and Girls'. This book includes new material on radar, atomic energy, and nuclear power.

The Boy Electrician. By Alfred P. Morgan. Illustrated. New revised edition. (Lothrop, 1948) Clear explanation of principles of electricity. All plans tested and the apparatus built by boys. From the simplest equipment to radios and complex motors.

Electronics in Action. By James Stokley. (Whittlesey, 1946.) Nontechnical.

Experiments with Electricity. By Nelson F. Beeler and Franklin M. Branley Illustrated. (Crowell, 1949.) How to make an electric buzzer, a secret door lock, an electric motor, etc.

First Electrical Book for Boys. By Alfred P. Morgan. (Scribner, 1951.) A well-illustrated, easy-to-read book on

simple principles of electricity.

Elementary Electricity. By Edgar P. Slack. Revised edition. (McGraw, 1943.) Treatment based on modern electron theory. Elements of direct and alternating currents. Used in vocational and electrical schools.

Boy and a Battery. By Raymond F. Yates. Illustrated (Harper, 1942.) Tells how to construct an electric battery, how to revive and control one. Very popular with boys. Radio and Television

Modern Radio. By Kingdon S. Tyler. Illustrated. (Hareourt, 1944.) Explains encb operation from the studio to the hroadcast receiver. Chapters on television and radar.

Telecasting and Color. By Kingdon S. Tyler. Illustrated by James MacDonald. (Harcourt, 1946.) Basic principles of television in black and white. Contains a good list of books on the subject. Chapters on colored television.

Radio for the Millions. By the Editorial Staff of Popular Science Monthly. Illustrated. (Grosset, 1943.) Tells how to be a radio huilder and lists in detail whatever parts are

necded to build a particular set.

Here Is Television. Your Window to the World. Thomas H. Hutchinson. Illustrated. (Hastings House, 1947.) A eomprehensive account of television with a forecast of the development. Nontechnical. For the professional as well as the lay reader.

Television Works Like This. By Jeanne and Robert Bendick. (Whittlesey, 1949) A graphic presentation in words and pictures. Lists special terms used with an accurate definition of each. Takes reader hackstage of a television

show.

Television Story. By John Floherty. Illustrated. (Lippincott, 1951.) "Radio and television are electronic sisters. Let's call one Audihle and the other Visible," says the author of a hook which answers many questions in an interesting way.

The Boys' Book of Communications. By Raymond E. Yates. Illustrated. (Harper, 1942.) Clear directions for con-

structing model sets.

The Radio Amateur's Handbook. (American Radio Relay League.) Revised annually. Contains elementary data but gives the latest developments, including television and shortwave transmission and reception.

Radar. By Orrin E. Dunlap. Illustrated. (Harper, 1946) What radar is and how it works. The author traces the history of radar from the early wave experiences of Hertz and Marconi through the application of the radio echo to push button in wartime. Scientifically accurate. Very readable

Television Techniques. By Hoyland Bettinger. (Harper, 1947.) Covers television writing and programing. While technical, it is not beyond the layman. Comprehensive disgrnms.

The Future of Television. By Orrin E. Dunlap. Revised edition. (Harper, 1947.) The appendix gives the historic steps in television from 1867 to Mnrch 1947. The author was radio editor of the New York Times from 1922 to 1940, later on the executive staff of R.C.A.

Magic

Professional Magic for Amateurs. By Walter B. Gibson. (Garden City, 1947.) A good basic book for the bohlyist of nny age. Selection of tricks from simple to difficult.

Learn Magic. By Henry Hay. Illustrated by Hans Jelinek. (Garden City, 1947.) Tells how to watch a magician and how to he a magician. Book list. Suggests magical outfits.

The Real Book About Magic. By Joseph Leeming. Illustrated. (Garden City, 1951.) Magic tricks with simple props, coins, rings, handkerchiefs, strings, ropes, etc.

Magie for Entertaining. By John Mulholland. (Grosset, 1948.) First published as 'The Art of Illusion: Magic for Men to Do'. "A beginning book for older boys eliminating sleight of hand," the nuthor says. Simple explanations

Illustrated Magic. By Ottokar Fischer. Translated and edited by J. B. Mussey and Fulton Oursler. Illustrated. (Macmillan, 1951.) A magician of international reputation explains the secrets of magical apparatus. Fulton Oursler's introduction, The Magic of Today, is illustrated with pictures of leading magicians and their special contributions to the art.

Magic Tricks. By John Scarne. (Crown, 1951.) A book for older boys and ndults by a magician who bas created a

number of games.

to ning way Madern Manic Manual By Jean Hugard (Harper 1939) introduction by Julian J. Preskauer. The author was one of vaudeville a famous performers of magic and knew many of the secrets of Houdini Keller and Thurston

Camping and Hiking

Blking Camping, and Mountaineering By Roland C

Gest (Harper 1913) A well-organized book with good bibliographies. The mountaineering section is of special interest. It contains a glossary of mountaineering terms and a 1 st of hiking and mountaineering clubs of North America Camping and Woodcraft By Horace Kephart (Macmif

isn 1921 ) "The most comprehensive book on living in the open ever published

Let a Go Camping By Herry Zurchy Illustrated (Knopf 1951) A practical book for the beg name camp

includes chapters on cooking first aid in the woods echble plants etc The Hiker's Handbook By Douglas Leechman (Norton 1944) A practical and readable book for enjone who makes

a hobby of walking Includes walks in the city long hikes, chapter on hiking clubs youth boatels in verious parts of the world laws and regulations for hikers The Cance By Robert E Pinkerton (Macmillan 1923)

Its selection care and use Camp Cooking By Horace Kephart (Macmillan 1951)

What foods to take How to skin dress and keep game and fish Gives recipes and time tables for conking based on long expenses a

The Junior Book of Camping and Woodcraft By Bernard 8 Mason (Barnes 1943) A large-sun book very fully illustrated with drawings and many excellent photographs of camp life. Designed for inexperienced campers and has im-

med ate appeal for younger children Summer's Children By Barbare Morgan (Morgan & Morgan Scaradale N Y 1951) A picture sequence of life at camp with a brief history of aummer camps. Very beau

tiful photographs by an artist who has caught the life of such activity in its natural setting Camping Can Ba Fun By Robert W Weaver and Anthony

F Merrill (Harper, 1948) An up to-data book suggesting new equipment for outdoor living which has come out of the second World War Baw to Lave in the Woods By Homer Halstend (Little

1948) Simple and practice! Log Cabina By William Swanson Elustrated (Macmillan 1949) Includes plans for ski huts stone and timber lodges,

rustic furniture etc Interesting approach Handbook of American Mountaineering By Kenneth A Henderson Illustrated (Houghton 1942) The American Alpine Club's bandbook The first book to deal specifically with American mountains. Includes pract cal descriptions of climbing tachnique

Conking The Boston Cooking School Book By Farm e M Farmer Raymed with illustrations (Little 1951) A widely known standard cookbook which gives tempers tures and time sched ules and takes account of modern refrageration. The Fan ma Farmer Jumor Cookbook. (Little 1946) as a shorter and simpler book. It includes a chapter on candymaking. The Joy of Cooking By Irms S Rombauer Revised and

enlarged ed tion (Bobbs 1951) A generous comb nation of reliable recipes with excellent occasional communt. Well organized easy to use and very popular A Cookbook for Girls and Boys (Bobbs 1946) contains fewer recipes

Fun with Cooking By Mac Blacker Freeman Hiustrated (Random 1947) For beginners. The recipes are for things ch ldren like to eat Picture book size Large photographs
1001 Sandwiches By Florence A Cowles (Lattle 1949) haw ideas and clear directions for making a great variety of sandwiches for picnics parties school I nches As suggestive

to adults as to garls and boys Yaung America's Cookhook Compiled by the Home In at tute of the New York Herold Tribune (Scribner 1938)



young leather worker in reviving the skill of an a craft as she cuts materials for a tooled leather purse

Each recipe is part of a pfan for a pienic a family meal a nacu recipe is party of a pinn for a picano a formity meet a
camp ng trip e party Includes candymaking and outdoor
cooking Effectively illustrated in color and very popular
Cendy and Candy Making By Mary B Bookmayer (Bennett, 1920) For the home candymaker Clear and comprehensive

Handicrafts

Hendiersft for Gurle By Edwin T Hamilton 1932) A most ettractive well illustrated book Contains chapters on hooked rugs kno-block printing batik ertmetal jewelry leathercraft and other subjects of interest to older girls There is an excellent bibliography

The Complets Book of Sewing By Constance Talbot (Greystone 1943) An invaluable book for older garls who are doing their own rewing and dressmaking

By Mariska Kursas Design and Sew Christine Engler (Lippincott 1946) For girls in the teens A design for your figure age and individuality Prac

tical and interesting ms end meere-stra My Room Is My Hobby Written and illustrated by Marson Downer (Lothrop 1942) A fascinating book dealing with color carpentry work curta as etc Tells how to build a stage model and has a chapter on paper sculpture

Let a Make a Let of Things By Harry Zarchy Illustrated (Knopf 1948) Crafts for home school and camp Step-by step instructions and clearly drawn diagrams for making a

warnety of things from metals clay and leather The Art of Chinese Paper Foldion By Maying Soong (Harcourt 1948) Clear d rections and diagrams for making m mature boats tents chairs tables and party novelties

without science or paste Weaving for Amsteurs By Helan Coxtes Illustrated Reynord edition (Stud o 1941) Chapters on a mple weaving dyeing epinning variet is of weaving materials etc.
Ameteor Handerstt. By F C Hughes (Bruce 1947)

Various projects in wood and metals



atisfaction of making things with their hands keeps these hoys husy for hours in their basement carpentry shop.

Holiday Cards for You to Make. By Edith Flack Ackley. Illustrated. (Lippincott, 1940) A practical book for the amateur and hobbyist. Fully illustrated.

How to Make Dolls and Doll Houses. By Tina Lee. Illustrated by Manning Lee. (Doubleday, 1948.) Patterns Attractive pictures in color.

for making dolls of all sizes. Attractive pictures in color. Jewelry, Gem Cutting, and Metalcraft. By William T. Baxter. Revised edition. Illustrated. (Whittlesey, 1942.) An interesting book on a popular hobby. Includes a chapter on the identification of gem stones and minerals.

Arts and Crafts. By Marguerite Ickis (Barnes, 1943.) Basic techniques for bookbinding, weaving, leathercrafts,

pottery making, etc.

Popular Crafts for Boys. By Edwin T. Hamilton. (Dodd, 1935.) "Step-by-step instructions with accompanying line sketches have been given for making at least one article of each craft carpentry, mask making, lino-block printing, bookbinding, leathercraft, pottery craft, tin-can craft, miniature modeling, trick photography, soap sculpture, paper mosaics, plastic wood modeling, art metalcraft,

Make It and Ride It. By C. J. Maginley (Harcourt, 1949) Concise directions with diagrams for making hike trailers, wagons, scooters, jeeps, etc. Con-

tains a section on racers for the Soap Box Dcrby.

Dolls to Make for Fun and Profit. By Edith Flack Ackley. (Lippincott, 1951.) A practical guide for making dolls and

dolls' clothes.

The Wise Handbook of Knitting and Crocheting. By Miriam Morrison Peake. Illustrated (Wise, 1949.) Clear and complete instructions for knitting and crocheting, including materials, basic stitches and designs for every sort of garment and accessory for girls, hoys, and adults.

Carpentry

Child's Book of Carpentry. Written and illustrated by Jeanne Taylor. (Greenberg, 1948.) Clear directions and illustrations in color for constructing a boat, a bookcase, a chest, a picture frame, etc. The selection and handling of the tools are presented in a way that will interest

Tools and How to Use Them for Woodworking and Metalworking. Written and illustrated by Alfred P. Morgan. (Crown, 1948.) Full, clear directions for the purchase, the use, and the care of up-to-date tools. A practical handbook for amateurs. Experienced carpenters and metalworkers will respect it. The author is the owner of one of the largest tool collections in the United States.

Historic Models of Early America. By C. J. Maginley. Illustrated. (Harcourt, 1947.) Explicit directions for the construction of models of an oxcart, a log canoe, a horsecar an early bicycle, the first Ford, the first airplane, etc.

Carpentry for the Building Trades. By E. A. Lair. Illustrated. (McGraw, 1947.) Covers all phases of carpentry for high schools, technical and vocational schools Up-to-date in treatment. Author is instructor in Building Trades, Jacksonville (Illinois) High School. Includes a list of visual aids, blueprints, cte

Homemade Games. By Arthur Lawson. With a foreword by Angelo Patri. (Lippincott, 1934.) Instructions for building as well as playing shuffleboard, badminton, tother ball, cockamaroo, table tennis, and other popular games index includes a classification of games and the number of players required for each game. A suggestive book which will prove helpful to camp leaders as well as to boys.

Ontdoor Handicraft for Boys. By A Neely Hall. (Lippincott, 1938.) A variety of projects which can be made with simple tools—ski board, aquaplane, diving raft, trailers

for bicycles, etc.

Woodworking as a Hobby. By Emanuele Stieri. Illustrated. (Harper, 1939.) Clear directions for the selection and use of both hand and power tools in the construction and reconstruction of furniture, cabinets, bookshelves, etc.

The Boy Builder. By Edwin T. Hamilton. (Dodd, 1933) Contains full directions for making more than 100 articles out of wood with explanations of each tool and its use. The plans by the author were tested by boys before they were included in the book. Up-to-date diagrams and drawings.

The Carpenter's Tool Chest. By Thomas Hibben. Illutrated by the author. (Lippincott, 1933.) A well-written and delightfully illustrated book designed to give children elear ideas of the development of tools and the work of carpenters down the ages.

Railroads

Diesel-Electric 4030. Written and illustrated by Henry Billings. (Viking, 1950.) The construction of Diesel-electric locomotives is explained in detail in descriptive text and superb drawings. The author rides in the cab of the Pacemaker of the New York Central Railroad from Harmon to Albany and describes exactly what happens along the route.

The Modern Wonder Book of Trains and Railroading. By Norman Carlisle. Illustrated. (Winston, 1946) From

the first locomotive to model railroading. Readable text Boys' Book of Model Railroading. By Raymond F. Yates Illustrated (Harper, 1951.) Clear, concise instructions for the construction and care of a model railroad and for creating the surrounding scenery.

Iron Horses: American Locomotives 1829-1900. By E P. Alexander. Illustrated. (Norton, 1941.) A pictorial story of the development of the American locomotive from the first engine to run on rails. A large-size book illustrated with reproductions from authentic prints and lithographs. Clear descriptive text includes a list of locomotive builders of the United States.

Riding the Rails. By Elizabeth Olds. (Houghton, 1948) The true story of the building of American railroads vividly told and illustrated in color. A notable picture book.

Model Railroads. By Edwin P. Alexander. Illustrated. (Norton, 1940) The first comprehensive book on scale model railroading, including planning, construction, and operation. Exceptional illustrations and plans. For older boys and men.

Trains, Tracks, and Travel. By T. W. Van Metre. 7th revised edition. (Simmons-Boardman, 1950.) A completely satisfying book on railroads and transportation for hoys 10 years old and older by an authority on the subject.

Trains By Robert Selph Henry (Bobbe 1950) The story of the development of American railroads and railroad

ing told in a way to interest of ler boys and their fathers Numerous photographic illustrations and a historical piotorni map indicating ra frond routes supplement the text Engineering

High Wide and Deep By John J Floherts Illustrated (Lippincott 1952) Science and adventure with the US Coast and Goodetic Survey Unusual photographs of surveyors setting up their instruments on the ses and

mountomside

Underneath New York By Harry Granick Diagrams by Philip W May (Rinehart 1947) The first book to desenbe the anatomy of a modern a ty and apply technical imagination to h storical data. Effectively illustrated The Boys' Book of Engines Motors and Torbines Writtea and illustrated by Alfred Morgan (Serbner 1947)

About railroad locomotives airplane engines Descleng nes electric motors etc. Simple plans for making toy motors and engines Everyday Machines end How They Work By Herman Schneider Illustrated by Jeanne Bendick (Whittleses

1950) Clear explanatio a of all kinds of household machines and devices including electric toasters pressure cookers vacuum eleanere bubble lamps musical instruments. More than 300 affective pictures

It Works Lake Thie By Cept Burr Leyson Illustrated (Dutton 1942) Discusses automobile engines Diesel en

What Engineers Do an Outline of Construction By Wal ter D B nger (Norton 1938) The story of what has been eccomplished in the fields of civil engineering and construcion told by an engineer who knows the men ideas end materials he writes about

Drawing and Modeling The Netural Wey to Draw By Kimon Nicolaides (Houghton 1941) An original working plan for ert study designed to carry a student through one year. Free of the academic it leads to creetive work within the capacity of the student. An inspiring book for boys and girls who have a

definite interest in art. Fully illustrated Sketching es a Hobby By A L Gupt II (Harper 1936) Written with en eye to popularising drawing for fun without neglecting technical information. The author is a widely known art metructor

Making Pottery By Welter A de Seger (Studio 1934) One of the severel titles in the suggestive How to Do H

series issued by Studio Publicat one Making Weter Colors Behave Illustrated By Ehot O Hars (Putners 1932) A book written primarily for be-puners in water color Contains a partial bibliography of

useful books for the water colorist Animal Drewing By John R Skeaping (Studio 1941)

A beautiful book illustrated with the author a drawings and with a selection from other animal drawings The Art of Lettering By Carl Lars Syonsen (Van Nos-

traud 1947) Contains a large number of plates of succent and modern alpha bets. Gives the elements of lettering tools materials etc Discovering Design By Merion Downer Illustrated (Lothrop 1947) Design is everywhere but not everyone

This book is so clear in text and illustration that it appeals to any age How I Make Woodcuts and Wood Engravings By Hans

A Mueller (Tudor 1945) Highly recommended for stu-dents and amateurs. The nuthor is a distinguished artist and

teacher of the art Exploring Art By Luise C Kains and Olive L Riley Bustrated (Harcourt 1947) Art appreciation applied to daily life Presents experiments in color and form Covers the theater painting sculpture the crafts industrial design ete Well chosen illustrations from the fine-arts field and from commercial art are reproduced in color and in black and white The authors ere well known teachers of art in New York high schools



Ansmal X Royz By Branda Putnam Illustrated (Put-

nam 1947) Aimed at the young reader. The information as so well presented as to be of interest to enjone learning to draw The author is a distinguished American sculptor Meking Lineleum Cuts By Samuel Greenberg (Daye 1947) A large-size book. Photographs and block prints by the euthor and his students descr be every phase of linoleum cutting and printing Text clear and nontechnical The

author is art instructor in Chicago high schools Costume Design By Kay Hardy (McGrow 1943) A ract cal bendbook d scuss ng every phens of the subject

Well disstrated Peinbug for Enjoyment By Arnold Bianch and Dorm Lee (Tudor 1947) Of special interest to the amateur Step-by step examples of methods with many reproductions of the

work of other artests Color chart How to Make Pottery and Ceramic Sculpture By Julia Hamin Duncan (Sumon & Schuster 1947) A good book for begainers or teachers Describes materials a mple tools where to get them and how to use them Photographs show techniques

Silk Screen Color Printing By Harry Sternberg Illustrated (McGraw 1942) The youngest of the print-making arts from which many suggestions can be taken including the production of color posters Detailed drawings of the equipment and step by-step illustrations of the process Painting as a Hobby By S D Thach (Harper 1937) A primee for the amateur An excellent bibliography serves

as a guide to further study Monle The Record Book New Internat onal Edition By David

The Record Book New International Edition By David Hall (Oliver Durrell Inc. 1948) A music lover a guide to the world of the phonograph The most comprehensive guide available to all fine recorded music

The Children's Record Book By Harriet Buxton Barbour and Warren S Freeman (Grown 1947) A useful guide to the best recorded music for children with a list of suggested readings

The Game of Harmony. By Ross Lee Finney. (Harcourt, 1947.) "Harmony is a game that you play all hy yourself. Like crossword puzzles it will teach you new words." Author is professor of music at Smith College Ability to read music is taken for granted.

Making an Orchestra. By Dorothy Berliner Commins. Illustrated by David T. Darling. (Macmillan, 1931.) Description of all instruments, also a cbart with cut-outs to set up a small

orcbestra on paper.

The Road to Music. By Nicolas Slonimsky. Illustrated. (Dodd, 1947.) A lively and reliable introduction to music, beginning with the musical alphabet and ending with jazz, swing, and boogie-woogie.

Broadcasting Music. By Ernest La Prade. (Rincbart, 1947) Contains

Adventures in Symphonic Music. By Edward Downes. Decorations hy John O'Hara Cosgrave II. (Rinehart, 1944.) An attractive book for young listeners to broadcasts or records. Represents the work of 58 different composers.

What Makes an Orchestra. By Jan B. Balet. (Oxford, 1951.) An

original presentation of the players as well as the musical instruments. A picture book in color with lively informative

Tune Up. The Instruments of the Orchestra and Their Makers. By H. E. Huntington. (Douhleday, 1942) Large detailed pictures on each page show the instruments—percussion, wood winds, brasses, or strings held in the bands of a young player. Clear step-by-step text showing the development of the instruments.

The Junior Music Quiz. By Gladys Burch and Helmut Ripperger. (Schirmer, 1940.) An ingenious book of musical games. The last question in each quiz is concerned with the

music that follows it.

A Treasury of Gilbert and Sullivan. Edited by Deems Taylor. Arrangements by Dr. Albert Sirmay. (Simon & Schuster, 1941.) The words and music of 102 songs from 11 operettas. A book for the whole family.

First Steps in Playing and Composing. By Satis N. Coleman. (Day, 1930.) A very practical book which can be used

easily with younger children.

Alice in Orchestralia. By Ernest La Prade. (Douhleday, 1925.) A novel way of presenting the modern symphony orchestra. The author was o member of the orchestra which first gave symphony concerts for young people.

Fun with Fintes. By David Dushkin. Book design and illustrations by Alfred D. Sterges. (Univ. of Chicago Press, 1934.) Tells in a very clear, delightful way how to moke and play a flute. Contains a number of selections of music arranged for the flute. An original book with excellent working drawings.

Song Books

The Songs We Sing. By Hendrik Willem van Loon. With music arranged by Grace Castagnetta. (Simon & Schuster, Traditional nursery songs illustrated with lively drawings in color. Contains an excellent introduction to music. Very popular with young children.

The Flower Drum and Other Chinese Songs. Illustrated. By Chin-Hsin, Yao Chen, and Shih-Hsiang Chen. Foreword by Pearl Buck. (Day, 1943.) "The best introduction that Westerners," says Henry Cowell. Words in Chinese and English with piano arrangements in the style in which Chinese instruments accompany singers. Illustrations from authentic Chinese prints.



No play preparation is complete without stage make-up for the actors. Costume and cosmetics change these modern youths into old-time gypsies and bandits.

> Songs and Games of the Americas. Collected and translated by Frank Henius. Illustrated by Oscar Fabres (Scnlner, 1943) Words and music of folk songs and directions for playing old Spanish games known to the children of Latin-American countries.

Folk Song U.S.A. Collected, adapted, and arranged by John A. Lomax and Alan Lomax. Music edited by Charles Seeger and Ruth Crawford Seeger. (Duell, 1948.) "The 111 best American ballads" with illuminating descriptive notes on their sources. Contains a selected list of books on American folklore and a list of record albums. A book of permanent interest and value in any family.

The Spanish-American Song and Game Book. Illustrated. Compiled by workers of the Writers' Program, Music Program, and Art Program of the Works Projects Administration in the state of New Mexico. (Barnes, 1942.) A variety of characteristic games and songs from Sweet Orange to New Mexico Hockey presented in Spanish and in English.

Songs of American Folks. Collected by Satis N. Coleman and Adolph Bregman. Illustrated by Alanson Howes. (Day, 1942.) A well-chosen, delightfully presented collection by well-known authorities.

Sing It Yourself. By Dorothy Gordon. (Duttoo, 1928) A collection of folk songs from "The Young People's Con-

cert Hour" with interesting notes about them.

Fireside Book of Folk Songs. Edited by Margaret Bradford Boni. Arranged for the piano hy Normon Lloyd Illutrated by Alice and Martin Provensen. (Simon & Schuster, 1947.) A large collection of well-chosen songs including ballads, work songs, both English and American, marching songs, Christmas carols, old hymns and spirituals.

Dancing

How to Become a Good Dancer. By Arthur Murray. (Simon & Schuster, 1947.) The art of dancing presented by a leading contemporary outhority. Illustrations and diagrams are explicit in every detail. The one-step, the walt, the tango, the rhumha, the fox trot, and swing dances are considered. For young people ond adults.

Folk Dances and Singing Games. Twenty-six folk dances Described and edited by Elizabeth Burchenal. Revised edition. (Schirmer, 1933.) Music and full directions for performance and many illustrations are included. 'Dances of the People' is a second volume of 'Folk Dances and Singing

Games'. (Schirmer, 1934.)



The backstage craw in a play has just as much fun as the actor. These gut artists are making the first eketches for what will turn out to be an effective backgrop

The Dance By John J Mertin Illustrated (Tudor 1947) The story of the dance told in pictures and in test by the dance conte of the New York Times 250 acres photographs. The book is in four perts Basic Dance for its Sake of the Dance Folk Deneing and Bell Bunce for the Sake of the Dance Folk Deneing and Bell

room Dance as a Spectacle
The Ballet Lover's Pocket Book By Kay Ambrove Hustrated (Anopi 1945) A small profusely illustrated book calculated a profusely illustrated book

calculated to increase understanding of the srt of beliet
Play Production
Fees the Footights By E B (Zeke) Colven Illustrate
(Whittiesey 1940) A practical approach to acting The
suther has had many years of dire ting experience. Dis-

cusses breathing helitis make-up how to study e part distion etc.

Producing the Play By John Gassner with the New Bone Technician a Hand Book by Philip Barber (Dry den 1941) Two books in one Combines the esthetic and Fractical aspects of the subject. Includes a blobgraphy and

actable contributions based on productors procedure: For Actable contributions based on production procedure: For Acting The First Six Leasons. By Richard Boleslavski. Chestre Arts 1933. Dialogues between a would be active and a well known producer in which he attresses the unpor

tence of concentration memory of emotion dramatic action characterization observation and rhythm. The Art of Pay Production By John Dolman Jr. Revived cition. Illustrated (Harper 1948) Full treatment of the practical phases of acting directing and staging. A standard book in which the illustrations are an important

lesture
The Play Book By Jean Carter and Jess Ogdra Hustrated (Hercourt 1937) An elementary book on stage technique with nine plays of various types Includes a last

of plays

Practical Stage Directing for Amsterne By Emerson
Taylor (Dutton 1916) A simple clear and comprehensive
handbook for the smatter director and actor

Costuming a Pisy By El substit B Gimbail and Rhea Most Deagma by Rhea Weils (Appleton, 1925) Clear drett ons for dos gaing costumes with particular emphasis on anatomist and cool for dos gaing costumes with particular emphasis on anatomist and color Contains also a brief history of costume and evcellent plates allowing changes in it as and sit bouesta from the early Assyman to the Cerl War period because of the contract of the

Costuming the Amateur Show By Dorothy Lynne Saunders Illus trated (French 1937) This handbook for emsteur producers gives detailed matructions for making a wide variety of costumes and special information in relation to stage prop-

Size Scenery and Lighting By Sumuel Selden and H D Selfman (Applaton 1936 ) A comprehensive and practical handbook by two technical directors—one of the Cardina Play makers the other of the Unit set by of lowa Theater Conta na chapter so, lowar Theater Conta na chapter so, Lighting the Stege with Home

Mede Equipment By Jack Stuart, Knapp (Baker 1946) Clear explan, ation of Ighting and direct ons for making acquipment for those who have himted (unds or who seldom produce Play Production By Militon with filostrated by William Steinel (Appleton 1944) Up-t-o-dete practical

Eliustrated by William Steined (Appleton 1944) Up-to-date practical d rections covering all phases of play production Prepared for me in little shosters schools and colleges Illustrations are in full rolor.

Marionettes

Remo Bufeno a Book of Puppetry
Edited and compiled by Arthur Rich
mond Hiustrated by Romo Bufano (Macmillan 1950)

mond fligsteated by Rome Bufano (Macmillan 1990). Constant the full test of Bs e Pupps illnoways and also the plats Rome Bufano wrote for the memorate thester include both band and string tuppets and a short hatory of puppets. New methods of construction and advice have been added annot the death of ferno Bufano who was the servator of the most Original work in this field in America. The most unpertain book on the subject.

Manner times me before in a course.

Manner times have been freek Acidety (Lappinest: 1979). The best earth boy for a cloth Friesk Acidety (Lappinest: 1979). The best earth boy for a cloth free free tree to making a strong as the strong a strong as a course and a course and a seven the bod es. Good patterns are included. Younger challenge like this book.

chidned like this book.

Handbook of Fast Pappets. By Bees & A Ficklen. (Lipponcott, 1935.) Compares fist puppets and maximetted gives history of fist puppets tells how to make them dress and act them suggests types of plays.

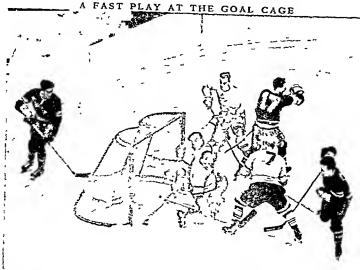
Easy Payets By Geriruds Fels Illustrated by Albert Pels (Crowell 1951) Directions for insking and using hand puppers out of smple materials at home. Reludes chapters on paper maché heada and e variety of singe sets A fams p hock

Management a Hobby for Everyona, By Mabel F and Leadin Beaton, Ritoritade, (Corwell, 1918). Everlinat from the practical how to-do-st sogie. Everything is shown in clear photographs and diagrams. Does not include hard pumpets these with the control of the control of the gungest shown in Ry New York.

Pappetry An International Yearbook of Puppets and Manonettes Echted by Paul McPharim Published annual by (Hastings House) A l'mited edit on of Mencan Folk Puppets Trad tional and Modern with drawings by Lola

Oueto sed text by Roberto Lago was published in 1941
Marionettes Are People By Edith Thane Illustrated by
George Alan Swamson (Duell 1943) An original approach
to making and enoying marionettes off staga Includes
full-scale patterns and a lat of materials.

The Puppet Thestre Handhook By Marjors Batchelder Hinartased by Denglas Anderson (Harper 1947). A comprehensive technical handhook covering the production of suppost shows and the construct on of all types of puppets Band on the varied experiences of Paul McFhart and others Excellent b biterrates.



In this action picture, we see the heavy padding and gloves worn by ice-hockey players to protect them. The white-sweatered goalie (on knee) is trying to block the puck that has been shot at the goal by a dark-aweatered opponent.

HOCKEY. The object of this game, which is played with curved sticks, is to drive a disk (puck) or a ball through the opposing team's goal. The puck is used in ice hockey; the ball, in field hockey.

Ice hockey of a sort may have begun as early as the 18th century in northern England. But today's fast and furious game originated in Canada—probably at Kingston Military College, Ontario, in 1876. In 1895 Canada introduced its national winter sport to the state of Maryland, and during the late 1920's, indoor rinks of artificial ice rapidly spread the game throughout the United States.

Meanwhile, in 1908, a professional league sprang up in Canada. From this grew the National Hockey League (organized 1917), which was strictly Canadian until Boston joined it in 1924. Each year, teams of this league play for the Stanley Cup, emblematic of the world championship. This cup was donated by Lord Frederick Stanley in 1893, when he was governorgeneral of Canada. Today, professionals are paid as much as \$15,000 a season. They are in their prime from 24 to 30; their playing life averages ten years.

Most ice-hockey amateurs in the United States play by rules of the National Collegiate Athletic Association, which are similar to professional rules. A team consists of six players—goalie, right and left defense, right and left wing, and center. Substitutions are frequent. A recommended playing area is 200 feet long and 85 feet wide with rounded corners. Lines across the ice divide the area between goals into three equal zones. A goal cage, 6 feet wide, 4 feet high, and from 17 to 22 inches deep, is centered at each end of the rink at least 10 feet from the end boards. In front of each goal is marked a rectangle, or "crease," into which the puck must precede an attacking player. The puck is a black rubber disk one inch thick and three inches in diameter. It is manipu-

lated with the hooked end of the hockey stick and is passed from player to player. It may slide at 90 miles an hour. A team gets one point when it shoots the puck into the enemy goal.

the enemy goal.

The game is divided into three 20-minute periods with 10-minute rests between. In case of a tie, one overtime 10-minute period is played. For fouling, a player is sent to the penalty box for 2, 5, or 10 minutes, and the team is short a man until he has served his time. Some infractions call for a penalty shot no closer than 28 feet from the goal line.

The best players have practised from childhood to develop speed, quick thinking, split-second co ordination, and teamwork. Players born in the United States are now winning places on teams that not long ago were entirely Canadian.

Field hockey, probably of ancient Persian origin, was modernized in England by 1875. Thence it came to the United States a few years later. Girls took it up and in 1922 formed the United States Field Hockey Association. A team has 11 players—five forwards, three halfbacks, two backs, and a goal keeper. The field measures not more than 100 by 60 yards. At each end is a goal with an opening 12 feet wide and 7 feet high. The white leather-covered ball is about 9 inches around. When it is driven through the enemy goal, one point is scored. A game is divided into halves of not more than 30 minutes.

HOG. To be likened to a hog or pig is looked upon as an unpardonable insult, because it is understood to imply either greediness or filthiness. Jews and Mohammedans regard the hog as "unclean" and unfit for human food. But the hog is no more greedy than any other animal. It does have a liking for mud baths, since it finds these soothing to its thick skin; but otherwise it prefers being clean, and thrives better when not kept in a "filthy pigsty."

We can judge the hog's value as a food animal from the fact that, even though several religions ban pork as a food, the hog still furnishes a large part of man's flesh food. From ancient times hogs have been maintained as "side lines" on farms, getting part of their living from otherwise useless food scraps, and rooting in field, meadow, and forest for the balance of the food they need. No other animal turns "waste food" into human food so efficiently.

The hog is admirably suited by nature for such use by man. Hogs and their relatives belong to the Artiodactyla, or division of hoofed animals having an even number of toes on each foot. Most of these animals, such as deer and cattle, have complex stomachs suited to fibrous vegetable foods (see Ruminants), and live on broad stretches of grass or forest land. The hog

has a simple stomach and while it will eat anything, it thrives best on more concentrated vegetable food such as cereals, roots acoms cooked strehen scraps, and skimmed milk and other waste darry products

The head is well adapted to grubbing up roots and similar food Ex cept when domestic breeding has changed the shape of the head the hog has a long snout with a fleshy button containing the nostrals on the end, where they can best smfl underground food Each jaw has four tusks all pointing upward although domestic breeding has reduced the tusky in size In wild hogs they aid in digging and self-defense neck is short and carnes the he d low A hog's foot has four toes two of them forming the hoof and the outer two ending above the ground except when the foot sinks into mud Jelly like tissue and soft muscle between the bones make 'piga feet a delicate food

Occasionally, in some parts of the world, the hop has been used as a draft samme! In China the snot hard some In China the snot hard some some a long a horse, and an ass harnessed together to dings eart. An English hop breeder once drove to a fair with four logs drawing his carrange Hops can be through the properties of the product to learn some thangs. In section of the control of the fair through the properties of the fair through the properties of the fair through the parts of the control of the cont

The hog watmost machine-like in the precision with which it gains weight from its food. Through a hog a normal life 38 pounds of corn and two fifths of a pound of tankage will increase the hog s weight one pound. American farmers figure on making a profit wherever they can sell 100 pounds of five hog for the price of 114 binshes of corn.

After hose are between 6 and 10 months old and form hose are between 6 and 10 months old and form of the second of the second of the second store, and the feels becomes too fat to cure into the parties of hom and bacon. They are marked the therefore parties of home and bacon. They are marked the form of the parties of home and bacon. They are marked therefore parties of the parties of the parties of the of to meet a spend dismost log to parties. Making the parties of the parties of

Compared with cattle, hogs are more combined meat producers. The dressed carcass of a bog weight 75 per cent of the live weight a steer yields only 55 per cent. In nine months a sow may product 1500 pounds of finished pork and a litter of rossting pressured to the combined pressure of the product of the p

WAS THAT THE DINNER BELL!



young person a comment not a recent and the least the heart food com to perfecting the properties at the least the least to be selected annextions a se world not quite ready in him p gheaded way to be alubborn.

In the same time a cow produces one calf that weight 300 pounds when ready for market

Every part of the hog yields food or some by prodncts. The bristlesmake brushes and the hide makes a feather caffer pskin. Portions of the annal Intestine are eaten fixed as chitterlings, the melted fat forms lard for croking. All portions not otherwise used including the blood may be made into fertilizer.

The females called some may be bred when 8 or 10 months old and after 16 weeks they produce litters of from 6 to 8 pgs Subsequent litters may contain 10 or 12 pgn. The pugs are weaned in about two months then they are called abouts or shotes. A mature make bog is called a bour.

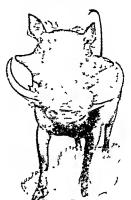
Farmers usually expect two litters a year, about February and August. Most sons are clumay mothers and usually kill some of the pigs by rolling on them and amothering them. Only about 56 per cent of all young p gs live to reach the market.

Breeds and Types of Hogs.

The wild ancestors of the domestic hog appeared in many regions during prehistoric tiries. The domestic hog has the same scientific name (Sus scrofa) as the European wild boar, which probably was its ancestor, with some crossing from Chinese varieties (see Boar). Perhaps hogs were first domesticated in China.

Modern domestic hogs are classed as either the lard type or the bacon type, with several breeds in each type. A bacon hog should have a long body to yield the maximum amount of bacon from the sides; a lard hog has a shorter, stockier body, with more lard and larger hams. In either type the loins should be large, so that the upper hind legs will produce good hams; the less valuable head, neck, and foreshoulders should not be unduly large. The best hams weigh from 12 to 16 pounds, the best sides of bacon from 10 to 12 pounds.

the nation's swine. The United States normally produces about 60 million hogs a year, which is about one-fifth to one-sixth of the world's total. But government restrictions and short feed cut the number to some 37 million in 1935. The only region that exceeds the United States is China, with a production of about 76 million a year. Central and southeastern Europe follow with a joint total of about 44 million. Russia and Brazil produce over 20 million head apiece. France leads the smaller producers with about 6 million. Spain, Canada, and the British Isles, with about 5 million apiece, come next. Mexico produces about 4 million and Denmark 3 millios. These are averages from 1926 to 1943 and account for over 80 per cent of all the world's swine.



## TWO WILD ODDITIES OF THE PIG TRIBE

Here is the champion fighter of pigdom, the fierce little peccary fierce little peccary of the American tropi-cal forests. Peccaries hve and fight in herds, and even a jaguar thinks twice before invading a herd in invading a herd in search of a meal.

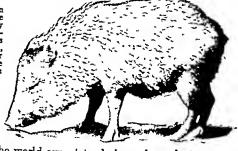
This comical fellow is a male wart hog from Africa. What good his, no odd looks do him, no one has discovered. Apparently his ancestors just developed into freaks, and the tribe has stayed that way ever since.

The principal American breeds are the reddish Duroc-Jersey, the black Poland China spotted with white, and the Chester Whites. English breads grown in the United States are the black Berkshires, the Hampshires with a white belt on the foreshoulder, the reddish Tamworths, and the white Yorkshires. The last two are hacon hogs; the others belong to the

Many diseases attack swine. Most of these can be prevented by keeping the yards clean and the beds dry. Cleanliness alone, however, is of no avail against cholera; but science with its serums is bringing this disease under control. The former loss of some 130 to the thousand has been reduced to between 25 and 30; but the disease still causes losses of from 15 to 20 million dollars a year, depending upon hog prices. Another dangerous disease of hogs is caused hy a parasite worm trichina, which lodges in the mus-People can acquire the infection by eating insufficiently cooked pork. Thorough cooking and federal inspection at packing plants are the chief methods for safeguarding people against these dreaded

Great Hog-Producing Regions

Hogs are raised everywhere in the United States, hut principally in the corn states, to use this grain for fattening. Iowa leads in hog production with some 10 or 11 million head, more than one-sixth of



The world export trade in pork products averages about 21/2 billion pounds a year. Of this amount, the United States formerly furnished about half; but after 1929, its exports fell to about one-third of the world total. This loss was much less than that suffered by most of the country's exports. Because of the advantages of the United States, particularly its abundant crops of corn for fattening, pork is likely to continue to be one of the nation's leading farm exports. Pork is packed in nearly all parts of the country; the leading centers are Chicago, Kansas City, Omaha, East St. Louis, Sioux City, South St. Paul, and South St. Joseph. (See Meat Packing.)

Pork is commonly packed in brine for keeping, but the upper hind legs and cuts from the sides are smoked to make ham and bacon. In England, a "side" of bacon includes the foreshoulder and ham, or gammon; American bacon is cut from the side only. Smoked pork is soaked in a solution of hrine, sweetening, and soda nitrate or nitrite (the "sweet western" cure), or the pickle is injected with a syringe. After 20 or 30 days of curing, the meat is smoked over a hardwood fire for a day or more. In dry curing, the meat is packed in a dry pickle, then soaked in water.

The suborder of Suina, to which all swine-like creatures belong, is divided into three families: the Suidae, which includes hogs and wild boars, the Tayassuidae, which includes the fierce little peccaries, and the Hippopolamidae, the hippopotamus family. Among the interesting species of wild swine are the long-tusked Babirussa of the island of Celebethe African wart hog, Phacochoerus africanus; and the river hogs of the genus Potamochoerus, found in Africa and near-by islands. Peccaries are found in northern South America, Mexico, and as far north as Arkansas (eee Peccan).



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This is one of Hogarth's masteriy series of engravings called Marrisgs a la Mode satt iting the folles of the fashionable lite of he day. The sprawing v scount and he syswings brids at am d the disorder latt by a late party while the old a seward

dismay at the sheaf of bills he he de rom which the engraving was of he most successfu works in 1s beauty of 1 ght color an compos on Not co how fat hfully Rogarth brings out de all

HOGARTH WILLIAM (1697 1764) Few nen have had so keen an eye for the expressions that the hu man face can reg ster as did the English panter and engraver William Hogarth No art at has repreduced those express ons with more bit ng irony Charles Lamb calls Hogarth perlaps next to Shakespeare the most invent ve genius which this island has pro Hogart! was the first 1 ainter of genius born m England All the great national artists before h m

were men who like Van Dyck had been born abroad Hogarth was primarily a humorist and sat rist. He used paints and engraving tools as Volère Felding and Swift used wor is He has been called a master of caricature and he did contribute greatly to the development of techn que in this field A cancaturist m the modern sense of the word however usually rd cules individuals by evaggerating their conspic uous features Hogarth rarely dealt with individuals Rather he made fun of humanity as a whole sat ris-

ing w thout mercy its weaknesses and v ces In his own day many critics called Hogarth vulgar and thought h s art inferior Now he is generally placed high in the history of English art for his master ful techn que his originality his superh rendering of costume and setting and above all for the vital humor and humanness of his characters Most of his works are stor es on canvas or copper though he also d d some excellent portraits

As a boy Hogarth showed a remarkable g ft for mitmery and drawing. He tells us that his evereises at school were more remarkable for the ornaments which adorned them than for the every to itself. He was apprent ced to a silver plate engraver and at the age of 22 set up as an engraver for himself Soon he began to pa nt portra ts and groups and eventually found his true sphere in ridiculing human folly. His practice was to make a series of paintings and from them engravings which were sold by subscription Because printsellers shamelessly pirated his energy ings Hogarth was largely instrumental in securing the passage of an engray ng copyr ght act

Among Hogarth a works are the series The Har lot s Progress (1731-32) The Rake s Progress (1735) and Marrage à la Mode (1745) The six original namtings of the latter the Shrimp Grl and por traits of h meet and ha sister are in London Metropol tan Museum in New York City has his portract of Peg Woffington

HON'ENSTAUFEN. A German noble family of the Middle Ages to which belonged the Emperors from Conrad III (1138-1152) to Conrad IV (1250-1254) inclusive—with the exception of Otto IV (1198-1214), who was a member of the rival house of Welf (see Guelfs and Ghibellines). Castle Hohenstaufen, from which the family took its name, was in Swabia. The Hohenstau'en epoch was the most glorious period of medieval Germany, especially the reign of Frederick Barbarossa (1152-1190).

HOH'ENZOLLERN. The castle Zollern (or Hohenzollern), near the Danube River in Swabia (south-

western Germany), was first built by one Count Frederick in the year 980 (rebuilt 1850-67). From him is descended the family which, after 1415, gradually raised Brandenburg-Prussia to the rank of a first-rate power in Europe, and in 1871 founded the German Empire. Frederick II and William II are the most notable members of the family. The castle also gives its name to the tiny province of Hohenzollern (441 square miles; an outlying part of Prussia) which surrounds it. Prussia.)

HOLBEIN (hōl'bīn), Hans (1497-1543). In the long ago days when Luther was drifting into his revolt against the Roman Catholic Church, Hans Holbein, a young German artist, left his father's studio in the wealthy old cultured city of Augsburg, to seek his fortune in Basel, Switzerland. His purpose was to furnish illustrations for the wonderful new printed books that were there being published.

The busy Rhine city of Basel boasted in those days "at least one learned man in every house." Among these scholars was the famous Erasmus, who had come to Basel to oversee the publication of the first printed edition of the New Testament in the original

Greek, and other works which he had edited. This wise man and the young artist at once struck up a friendship and Holbein drew pictures for a very clever satire, called 'The Praise of Folly' (Encomium

Moriae), which Crasmus had written for relaxation and which his friends persuaded him to publish. The pictures were quite as clever as the text, and through all the 400 years since that time, whenever 'The Praise of Folly' has been reprinted, Hans Holbein's illustrations have been reprinted with it.

Holbein drew illustrations for many other books also, among them Martin Luther's translation of the Bible into German. He displayed great skill also in other lines. He painted pictures and portraits; he designed stained glass windows; he even drew designs for female costumes! The old saying that artists

HOLBEIN'S PORTRAIT OF THE KING'S ASTRONOMER

This picture of Nicholas Kratzer, assistancer to Henry VIII, is one of the great series of portraits made by Holbein during his stay in England. It is now in the Louvre.

are born and not made must have been true in the case of Holbein, for without a magic gift from some good fairy, he could hardly, at the early age of 20 years, have excelled in so many lines.

After a time rel gious strife between Catholies and Protestants became so bitter that he in Basel was very unsettled Then Holben with a letter from his friend Ensamus to an influential Englishman again set out for a strange land. This time he went to Lendon and there met with a favorable receip too Later he became court painter to Henry WIII. The king a fondness for Holben has a rased into legend. When a nobleman complained of the favor sho in the attst the king said. Viy lord know that of seen peasants I can easly make seven ear's but of the seven earls I cannot make one Holle and

In England Holbem was known chefig we a painter of portraits. An old account of his servers at the court of Henry VIII relates that he painted the jor trait of the king. He size so will that everyone who looks is astonished since it seems to live as if it moved its head and himbs.

The account continues

moved its head and hmbs The account continues.

He made portraits of the principal folk of the realm in such numbers that it is a matter for wonder how

he could ever have finished so many!

Although his life was spent in Svizerland and England Holben is regarded as a German arts. His painings and drawings are to be found n most of the larger galleries of Europe. He Madones in the Ducal Plakee of Darmstull is one of Germany'e matterpaces. His most celebrated picture is the portant of his fined Darunau is the Louvre Paris. The finest collection of the Holben mainstures is in the Mctrophita Museum of New York. City

HOLIDAYS In medieval times most days of citheration were set aside by the church and called Holy Days Gradually the name changed to holidays Modern holidays may honor political leaders or historical events as well as holy persons. They are the occasion for practice and other programs and afford a bird vacation. The article Festivals hists the

thief holidays and festivals

HOLLAND The name properly belongs to no western provinces of the kingdom of the Netherlandsborth Riolland and South Holland They are the most densely populated of the II provinces and con tun Amsterdam Rotterdam Hantlem and The Hagus Because of the historic economic and political importance of the two provinces the name Holland is often exert to the whole kingdom of

the Netherlands (See Netherlands)

HOLLY During the Christmas season North Americans and many Europeans decorate their hones with wreaths and sprays of holly The high-tred bernes and dark green prickly leaves provident trad tonal dark green prickly leaves providen trad tonal and dark green prickly leaves providen trad tonal and dark green prickly leaves providen trad tonal dark green prickly leaves providen to the trade of the

There are about 300 species of holly shrubs and trees throughout the world. Many but not all are evergreens. In some species the leaves are black sh and the berries are yellow or black

The chief North American species known as American holly grows naturally along the Atlante coast from Massachusetts into Florida and in the Southern States as far neet as eastern Texas. The trees aver

ne 40 to 50 feet in he ght and the trunk 1 to 2 feet in diameter Only the female trees bear fruit

European or English holly has glosser leaves than American holly and is more ornamental. It is cultivated as a garden shrub in America as well as in England. Farmers raise it commercially for Christians and England. Farmers raise it commercially for Christian and English Schuld region. The wood of both American and English holly is fine grained and well suited to cabinet work.

The scientific name of American holly is *Ilex opaca*. The bark is light gray and smooth the leaves aimple alternate elliptical or oxal with pointed apex and base and slarp as nelike teeth. The fruit a small br hatel herry remains on the tree far into nuter centific name of European holly *Ilex og nfolium*.

HOLLYHOOK. The tail stake of the hollyhock with their large leaves and bg bright wide-open flowers provide a colorful background for an old fashioned garden. They are especially effective growing against a wall or a fence.

is a native of Ch na but bad spread as far west as the Holy Lan I by the time of the Crussdes Historians belove it to be the holy mallow which the Crussders brought back from Palestine to Europe The Pilgrams can ed the hollyhock to America

The end set holly locks had a sigle blossoms. They see producing rose-mak shading into red and white Today there are n againtient double holly hocks and observange from sellow to purple and marrow Holly-hocks love the sun but will grow in part all shaded the light reaches that lower leaves. They are not sell-fraued soi. It is heat to sow the seed in July and transplant the young seeding early the net spring placing the erona a little below the surface. The holly hock will bloom that summer.

These ent finance it he holly hock is Althora rose flovers about 3 inches across going on going and prefunded from the stalk culty 5-pointed reinforced by a cred of 6 to 9 tracts peaks 6 in number large wadge-shaped convolute abud stames numerous unted in a tube styles numerous starn tall tuck hary leaves 5- to 7 lobed rough rounded

thick harry heart-shaped

HOLMES OLIVER WENDELL (1809-1894) When James Russell Lowell chose Holmes to he the first prose unter for the new Atlantic Monthly (1857) he declared confidently The success of this magazine rests with Dr Holmes He has written Ittle but you'll see His mind is like a hright mountain stream that has been dammed up in the hills waiting only an outlet to the ocean. He has a wonderful store of thought - serious comic pathetic and The delightful essays entitled The Autocrat of the Breakfast Table proved Lowell a true prophet for nothing so witty and wise so humorous and kindly had been produced in America. In whatever he wrote Holmes showed a boy's fresh ness a man s energy and purpose a poet s gift and the high moral tone that marked the work of the great New England writers of h s day In putt ng his thoughts on paper he lost none of the sparkle and personal charm that made him a celebrity as conversationalist and lecturer.

Dr. Holmes's success as a writer was the more remarkable because writing was not his chief business. He was a busy physician and Harvard professor, who, besides caring for his big practise, made original scientific investigations and wrote medical works. He was born in Cambridge, Mass. His father was a Congregational minister, professor at Harvard, and historian. Holmes himself had the advantages which he said belonged to a man of family-namely, "four or five generations of gentlemen and gentlewomen" back of him, and "the tumbling about in a library as a child." His life was a busy and uniformly successful one, free from startling events or great misfortunes. On graduating from Harvard he studied law; then studied medicine in Boston and in Europe.

His fame as a writer began while he was still in college, with his poem 'Old Ironsides', that saved the old frigate Constitution from destruction. The volume that contained the funny 'My Aunt' and the inimitable humorous-pathetic 'Last Leaf' appeared the year that he took his M.D. degree at Harvard. So often was Holmes called upon for verses for special occasions that he has been called the poet laureate of Boston. The reputation that his 'Autocrat of the Breakfast Table' brought him never dimmed. He followed those essays with 'The Professor at the Breakfast Table' and 'The Poet at the Breakfast Table', and found time also to write two novels. Not all Holmes's poetry was humorous, as was 'The Wonderful One-Horse Shay'. Some of it was beautiful and inspiring, like 'The Chambered Nautilus', one of the most widely quoted of poems.

Holmes was greatly loved, for he was wise and witty and at the same time cheerful and kind. He could share his culture with people without showing the slightest hint of chilling superiority. He received many honors both in his own country and in Europe.

Principal works: Books of poems-'Songs in Many Keys' (1861); 'Songs of Many Seasons' (1874); 'The Iron Gate' (1880). Nords—'Elsie Venner' (1861); 'The Guardian Angel' (1867). Essays—The Autocrat of the Breakfast Table (1857-58); 'The Professor at the Breakfast Table' (1859); 'The Poet at the Breakfast Table' (1872); 'Over the Teacups' (1891). Memoirs—'Memoir of John Lothrop Motley' (1879); 'Life of Ralph Waldo Emerson' (1884).

HOLMES, OLIVER WENDELL, JR. (1841-1935). As a justice of the Supreme Court of the United States, Oliver Wendell Holmes, Jr., became known as "The Great Dissenter." Time after time, when the high court handed down a decision, tall, thin Justice Holmes delivered a "minority opinion," or dissent. His dissents were so sound that they influenced public thought and many later became a part of the law of the land.

Justice Holmes believed the law should change to meet changing social conditions. "It is revolting," he wrote, "to have no better reason for a rule of law than it was so laid down in the time of Henry IV." Acting on this belief, he condemned child labor as

uncivilized in the modern community and upheld the right of strikers to form orderly picket lines. Holmes felt that the protection of the law and the Constitution should also be extended to those whose beliefs might be considered dangerous. But though the opinions of Justice Holmes often found him opposing the interests of private property, he was no radical. He believed that, "For most of the things that properly can be called evils in the present state of the law, I think the main remedy is for "GREAT DISSENTER"



Oliver Wendell Holmes, Jr., won fame in the field of law.

us to grow more civilized."

Justice Holmes came from a scholarly family. He was born in Boston on March 8, 1841. His father, although a surgeon, was better known as a writer. Young Holmes was educated in private grammar schools, and at 16 entered Harvard University. Upon graduation in 1861 Holmes enlisted as a lieutenant in the Union Army. Before his war service ended, he was wounded three

times and promoted to lieutenant colonel. During the war he was forced to reprimand Abraham Lincoln. The president stood on a wall of Fort Stevens to watch a battle. As bullets flew around Lincoln, Holmes cried, "Get down, you fool!" Lincoln dropped to safety and said, "I'm glad you know how to talk to a civilian."

Holmes studied law at Harvard and was admitted to the bar in 1867. After some private practise, he taught law at Harvard and served as editor of the American Law Journal and Kent's Commentaries on American Law. In 1881 he wrote 'The Common Law', which is regarded by many as a classic book on the law.

In 1882 Holmes was appointed a justice of the Supreme Court of Massachusetts. In 1902 he was made a justice of the Supreme Court of the United States. He served till he was 91 years old, resigning in 1932. In 1933 President Franklin D. Roosevelt visited the old justice and found him reading Plato. "To improve my mind, Mr. President," explained Justice Holmes. HOLY ROMAN EMPIRE. It was on Christmas Day of the year 800, when Pope Leo III in the church of St. Peter's in Rome placed a crown on the head of the Frankish king Charlemagne as he knelt in prayer, that the peculiar organization which we call the Holy Roman Empire first came into existence (see Charlemagne). Amid the breakup of the Frankish kingdom after Charlemagne's death, the Empire for a time disappeared. It was revived by the Saxon Otto I, king of Germany, in 962. From that time until its final abolition in 1806, the Empire maintained some sort of existence; but in its last three centuries it had become, in the language of the witty Frenchman Voltaire, "neither holy, nor Roman, nor an empire."

In theory the Holy Roman Empire was the counterpart in civil government of the universal Catholic church in religion Just as God had placed the popover his church, 80, it was reasoned, he had placed the emperor over all kings and princes. In practise the Empire after 962 included only Italy and Germany, end a wavering connection with Lorraine, Burgundy, Switzerland, and the Netherlands

In theory the Empire was elective The Golden Bull of 1356, issued by the Empiror Charles IV placed the hereditary right to elect in an Electoral College composed of the architecture of Mains Cologne, and Treves (Trier), the King of Bohemis the Count Palatine of the Rhine (Pialagraf) the Dake of Savony, and the Margrave of Brandenburg (Bavaria and Hanover were added later). In pracius the election was practically heredizary. After the savon of the savon of the savon of the savon and the savon of the savon of the savon of the theory of the savon of the savon of the savon 1254-1274, warnes houses (1223-125), the Hapeburgburg Bobeman ine (1347-1437), the Hapeburglik-3-1264, every for one rega, 1740-1745) For further details see the article Germany and the biographical articles.

# An ANCIENT ART Transformed into a MODERN SCIENCE

homemaker

HOME ECONOMICS AND MANAGEMENT From the earliest days of civilitation man shows has been one of his strongest interest it provides the bass for well being and lappiness and care for the family it kindles price and the joy of possession. Dong before there were cities, industries or the many interests of modern life, man was aware of the mean unjot home—e cave at the end of the hunt a primitive back in the forest clearing. And for woman throughout the ages home has been the focal point of concern and activity.

We might expect, then, that the scenee which deals with the home—called home conomise or describe with the home—called home conomise or describe sense,—would have been one of the earliest of all fields of knowledge to develop. But, strangely enough that was one of the latest to gain recognized as a special scenee. Not until 50 or 50 years ago did the scenes, as an independent branch of learness, the scenes are not present scenes. The scenes of th

Before that, knowledge about home making but no laboratory save the home itself. Choice recipes were handed down in femiles. Mothers taught their daughters how to clean, to cook, to sew. The bride patterned her home after her mother's home and managed it as her mother had taught her.

But as home making changed with the rapully changing world, his pals became anadequate Family traditions are little help to the modern hemenaker, who deals with a hundred new factors in houselexquag of which her grandingther never heard—electrical and mechanical directs, new systems of marketing, but fools, and new methods of preparing and marketing them. Home making now is far more netteresting and far less endaving more complicated and yet essertiant ever was before

So to meet these new conditions we have the setence.

Boreau of Human Nutritional II has become very caref. The Bureau of Human Nutritional II flome Donaction of the Department of Agriculture conducts surveys to learn be length of time spent on household tasks by women in various types of homes. It studies their drysmon of the family hudget among the various beam needs. It is the studies the manual time needs in the studies that the studies the studies the studies that the studies the studies the studies that the studies the studies that the studies that the studies the studies that the stu

also tests foods, tertiles, and household equipment, recommending the best and most economical Schools laboratories books newspapers, magazines the radio, and countiess mechanical inventions all try to help the

This scence goes over at many points into the region of art. The homemaker must know bould colors and fabrics pictures and bried bried, furniture and carpets together with soud details as the attracture deplay of food and the strangement of flowers. It touches very deeply the welfars of the work, for home trianing has been called the manspring of all effort for the betterment of humandard. Since women do most of the buying of commodities, home making has an unportant bearing on business and industry In abort, it is a field of almost unlimited scope and interest.

But for purposes of effectiveness home economics has been organized to cover only certain related subjects, such as sheller, food, clothing, home management child care, and family relationships Bhelter involves all the many aspects of our living conditions for who has studed it plans a house or chooses an apartment wisely, with regard for location, convenience of arrangement, proper lighting plumburg leaving, and washe overlay the character and the mental country of the control of

Institute Decession an Established Vocation Inleand decoration is another aspect of shelter I has become in stoil an elaborate study and an established vocation. The surgler phases of this study include the choice of furniture, draperies, for covering times to perfect the study of the study

The question of food has many angles in addition to mere cooking. Every year brings new evidence of the relation of health to diet. To plan the meals which provide the necessary elements for good health the housewife must know the chemical content of food. There has been a remarkable education of the public along this line in the past few years, and now almost everyone knows what calories are and which foods contain healthful vitamins.

The Work of the School

A home economics school teaches the functions of all foodstuffs. The student learns how carbohydrates and fats furnish heat and energy, how proteins build muscle and sinew, the regulating effect of water and roughage, the work of minerals in body building, and the part vitamins play in growth and the prevention of disease. She learns how to market wisely to get these nutrients in the best and most economical form. She learns what cooking methods will retain their heneficial qualities, how to preserve them, and how they are properly balanced in a nourishing diet. She also learns how to prepare foods with the least possible waste and how to "save steps" in cooking; how to set a table attractively and how to serve meals properly.

STUDYING CHILD CARE IN COLLEGE

These students of home economics at Stephens College are learning child psychology by watching how children react as they hear a story read.

Recipes and menus have taken on a fascinating variety as home economics experts have used their scientific knowledge and inventiveness in this field. It has been proved that the taste and even the appearance of food, as well as its chemical content, contribute to its effect on the human hody. The artistry of the homemaker in making meals attractive has a physical as well as an esthetic value.

Clothing is another of the home's major interests, so this science and art of the home deals with its many problems. School courses usually begin with plain sewing and mending, and extend into every phase of the selection, manufacture, and care of cloth-

ing. Whether a woman has studied costume design, millinery, tailoring, and the like, and can make smart clothing herself, or whether she huys the family outfit ready made, she must he able to judge textiles, leathers, felts, furs, and other materials to get the best possible values. Home economics teaches her the characteristics of various fibers and weaves, and tests for adulteration and "loading" in cloth. Explanation of manufacturing processes provides a hasis for detecting poor products and poor methods.

Home Management and Planned Spending

Every branch of home economics involves home management in its hroadest sense. Home-management units in home economics courses, however, usually include the planning and furnishing of the home in addition to the management of household affairs. The latter has to do with budgeting, household accounts, time schedules, the huying of household supplies, cleaning and care of the house, child care, home nursing, laundry work, and the like.

Planned spending of the family income is an important phase of home-management courses. Experts

have figured out what percentage of the money should be spent for food, for clothing, for shelter, and for all other things necessary to well-rounded family life. They have made sample budgets for families of various sizes earning various incomes. Ideal budgets, however, seldom fit the need of a given family. Since its expenditures depend upon its tastes and special circumstances, each spending plan must be especially made. A record of past expenditures will be needed. This calls for the keeping of household accounts. Banks, insurance companies, magazines, and department stores often furnish hlanks to be used for home bookkeeping.

Even though a family may not adhere to a budget regularly, it will need to check its record of expenditures before assuming any large undertaking—such as payments on a house. Following a plan of systematic saving gives the family a margin to care for emergencies. Home economics author-

ties advise that the entire family he consulted in making a hudgeting plan, so that all may understand the necessity of limiting some expenses to make the income cover all needs. If one memher of the family takes more than a just share, the rest will suffer.

All homemaking centers around the well-being of the child. There is no subject in the world on which mothers are so eager for knowledge and help. They realize that the dietitian, the hygienist, the playground expert, and most recently the psychologist, with his scientific understanding of child nature, can help them in this most important of all tasks.

In the schools, girls even in the elementary grades are taught something of child care, for often they are called upon to care for a small brother or sister This work helps to prepare them for the more important business of parenthood

Preparation for Home Nursing

The teaching of home nursing and modern methods of health preservation is a valuable branch of home economics Modern health study has proved that some of the traditional preventives do not keep disease away as was once thought. In fact, some old remedies are actually dangerous. They may injure health mstead of maintaining it, or they place reliance upon

measures which do not help.

If serious sickness does come, the advice of a physiclan should be asked, but certain danger signals should be recognized by the person who is responsible for family health. The doctor diagnoses the illness gives prescriptions and general orders but the responability of carrying out instructions rests on the home nurse. There are important duties other than administering medicine Taking temperature, pulse, and respiration, making the patient comfortable with hed devices, bathing, giving fresh air and simshine, and limiting the calls of visitors are all important.

Diet is sometimes as important in the treatment of disease and its control as are medicine and surgery Processes of elimination, digestion, and assumilation are very different in sickness from what they are under normal conditions One must know whether the patient needs a liquid, soft, or light diet, and how to prepare them The home nurse should be familiar with drug supplies and Erst aid equipment, and belieful remedies should be kept in the home medicine chest Great care should be taken to keep young children from experimenting with these supplies

Social Responsibilities Emphasized Right attitudes toward home hie are developed in family relationships classes. Appreciation of the

father's part in providing the income and the mother's part in managing the home is an important aim. The responsibility of each member of the family is discussed The importance of such matters as courtesy to parents, help in caring for younger brothers and sisters, care of personal belongings, and fairness in spending only one's share of the family meome are pointed out Responsibility to the community and the not on as well as to the home is taught.

A Field of Wide Opportunities While homemaking in itself is a profession, even if applied only to a small city apartment many people, particularly women, make of it a vocation of sader range There is no field today in which finer opportunities are offered the girl with a natural antitude for home economics or any of its many branches She may teach of course, either sewing or cooking or any of the other included subjects. She may also lecture to groups of women or guls under various auspices She may write on home economics subjects do editoral work for one of the many magazines and newspaper departments devoted to this field, or she may write copy for advertising the many things the howevile buys Many manufacturers of food products and trade associations made up of manufacturers of a certain type of product conduct research depart. ments, demonstration achools, and services of many other kinds for homemakers. These offer interesting

Radio and television have opened up other opportunities Women who prepare and give radio talks on food and homemaking are usually required to have a background of home economics training Specialists in foods may serve a hospital or hotel as distitum, or manage a fea room or restaurant County home demonstration agents are expert home economists, and various government agencies, such as the Department of Agriculture's Bureau of Human Nutrition and

Home Economics, also employ these specialists.

# Managing Family Resources for Good Living

EVERYONE enjoys a cheerful, well run home Not everyone, however, knows how to elente a home that will be enjoyed equally by all its members Success m home management means far more than having an attractive, comfortable house and a well-fed family. It creates a social, spiritual, and physical environ ment in which each member can grow in ability, understanding, and ideals It calls for the cooperation of all members of the family, although the mother, as homemaker, is the natural leader.

Home management deals with the use of family resources to achieve good hving These resources include time, energy, money, materials and the talents, micrests, and shifties of the various members At different periods of history, one resource his been more hmited than another. Colonist and pager households far from trading centers found materials much scarcer than the time and energy of their large families In modern times all members of a family

may be employed or in school. Their time and energy

may be relatively scarcer than money or materials Home-management plans require a careful examination of what is available and what is wanted. How much money can be spent? What talents and skills can each person contribute? What standards in food

and house care does each desire?

and lucrative positions to women.

A realistic examination is certain to reveal confacts between resources and goals Compromises and cons deration for the wishes of others are essential. Children may decide to forego mother's fancy desserts if they are more eager for her to have time to join m the family fun Mother may realize that she inberited" her standard of unmaculate housekeeping from a childles aunt. Somewhat less perfect care may be better suited to a household where growing

children myste their friends home to play Usually there sa't enough money for everything. This calls for decisions on which expenditures will bring the greatest satisfaction. Sometimes a family eouncil reveals that money is going for things no-body really wants. If they adopt without question the conventional standards of the community, they will pay in money, time, and energy for many nonessentials.

Getting the Most and Best for the Money

Care in buying and the use of money is important in home management. The homemaker who develops her judgment, taste, and skill in purchasing is able to contribute greatly to the success of the household.

Food marketing is a regular chore which she can learn by practise. Purchases of furniture, carpets, and the like may not occur often enough to give her adequate experience. She may need to spend considerable thought, study, and shopping time on such purchases. In furnishing a room, she will consider its use as well as its appearance. She will buy those articles really needed and place them for convenience. If a high-school daughter studies in her room, a desk

near the window proves a better furniture buy than the ruffled dressing table for which the youngster yearns. In selecting a rug for a family living room the homemaker will pay for good wearing qualities. For a little-used guest room a cheaper rug that is colorful and soft may suit best.

Economical food buying ealls for advance planning of menus. The homemaker can save money and marketing time by buying in quantity if her storage and refrigerator space is sufficient. Canning and deep freezing preserve plentiful foods for later use when they are more expensive (see Food Preservation). In making menus, she will keep in mind the flavor and appearance of the foods as well as their nutritional balance. (For charts see Food; Vitamins.)

Planning Helps Get Everything Done

The homemaker's day and week are so full of tasks that she can manage to handle them competently only by making careful plans and seeing them through

Planning euts down time-consuming eision and waste of energy due to skipping from one incomplete task to another. A workable plan has elastic periods-free time or time set aside for tasks that may be omitted. In these minutes the homemaker can make up for mistakes in estimating the duration of a job and for the dozen and one emergencies that arise.

Fixing the time needed for a complete job is often difficult. The work may need to be broken down into separate parts. For instance, a half-hour may be considered ample for setting a table for a dinner party. But if polishing the silver alone requires 20 minutes, the total time is underestimated.

Good management calls for rest periods and for scheduling easy and tiring jobs alternately. It requires consideration of the family's schedules. If the children are to tidy their rooms, the work must be postponed until after school.

Work Simplification The homemaker's en-

ergy is often as limited as



1. Sitting uses 8 per cent less energy than standing. This homemaker wisely sits at her ironer with dampened clothes within reach in a rolling basket. 2. Here a mother is making a week's school lunches at one time. She is sealing them in a package for deep freezing. 3. This woman saves steps by assembling fresh bed linen and cleaning aupplies on the way to clean a room.

4. Window washing goes faster when both hands are used and polishing cloths are handy.

#### HOW TO REMOVE SPOTS AND STAINS SUCCESSFULLY

A BILITY TO remove spots and stame from clothing, linens, and other household fabrics pays

the homemaker well It helps her to keen both fam ily and home looking neat and attractive. It prolongs the useful life of garments and home furnish ings. It cuts down laundry and dry-eleaning bills

A cardinal principle of snot removal is to do the job as soon as possible. Pressing over spots with a hot iron may set them. So may washing in hot scapy water Many stains come out easily if attacked at once but are stubborn if allowed to age in the fabric

A Shelf of Necessary Supplies

Equipment and supplies to be kept on hand mefude A medium-sized bow! of ensine! or heat-resistant glass medienne droppers a small glass rod with blunt ends Material to make absorbent peds-for example aid soft face towels or white blotting paper soft clean cloth

free from lint for eponging Cleaning sgents A noninflammable cleaning fluid such as carbon tetrachloride a 10 per cent solution of am monie absorbent powder such es French chafk com starch fuller a earth or a prepared dry-deaning powder

a bottle of denatured alcohol bleaches glycerin "Spotting" Techniques Sponging To sponge with carbon tetrachforide water

or other agent puten absorbent pad under the spot Mosten a sponging cloth slightly with the cleaning agent. Then sponge I ghtly Use stre ght strokes and feather out the moieture into the fabrio to avoid a ring. Do not rub Change the pad and eponging cloth as they become soiled Blesching Blesches may remove solor along with spots

and may weeken the fabrio. They should be used quickly and rinsed out thoroughly with water. They should be tested on colored fabrics in a hulden place as under a pocket to we whether the material remains colorfast

Chlorine bleaches can be used in varying strengths on cotton linen rayon and nylon Note directions on the

bottle and follow them carefully Sodium perborate is one of the best bleaches for all types of materials. It is sepecially good for white wool ens Mix four tablespoons of the powder with one pint of lukewarm hater and sponge the spots Or stretch the stained fabric over a bowl of hot water dampen the stain shake sodium perborate over it allow to stand for one to two minutes then sponge and rinse with water One teaspoon of sodium perborate in one pint of hydrogen per ox de used immed ately after mixing will usually remove

grass beverage mud scorch and perfume stans Hydrogen perovide as a unid bleach for all fabrica Apply it to the stain with a medicine dropper or a glass red or sponge the spot To make it more effective add a few drops of emmonia a teaspoon of borax or a tea-

spoon of sodium perhorate to a pint of perovide Safe Handling of Synthetics Water weakens rayon so trest wet rayon gently If it is necessary to bleach rayon

the sodium perborate or hydrogen peroside by prefer ence A weak chlorine bleach may be satisfactory Alcohol dissolves acetats rayon If in doubt as to the type of rayon test a seam edge with alcohol before using this agent to remove spots For other types of rayon di-

lute sloohol with two parts of water Spots tend to remain on the surface of mylon and can usually be washed off easily with even and water It is safe to use bleaches on white or coloriast nylon

Special Treatment for Special Stains Blood Soak washable fabrics in cold water until the stams are fight brown Then wash out the stams with warm (not hot) sospy water Frash blood on unwashable fabrics can somet mey be enouged out with lukewarm water To remove old or stubborn stems use a bleach

following carefully the directions under Bloaching Candle Wex With a dull knife scrape off the caked wex

Then meet the stained portion of the meterial between clean white blotters and press with a warm iron Chango the blotters as they become soiled Next sponge the stain with carbon tetrachloride Laundoring usually removes any remaining color. If the fabric is not washable aponge color stams with denstured alcohol using one part of alcohol in two parts of water

Condy and Other Sweets Spots from sweets that are chiefly sugar often disappear upon gentle spong ng with lukewarm water If the candy contained chocolste cream or other fat follow the direct one for removing fats. If stains reteam try the hydrogen perovide and sodium per-

borate method described under Bleaching Ckewing Gum becape off as much of the gum sa pos-

mble using a dull knife. Sponge sway the rems nder with earlion tetrachloride

Ceffee To remove coffee epots from washable fabrics, stretch the etsused part over a bowl not too tightly and secure it with a rubber band. Pour boiling water through the stain from a height of at least two feet Rubbing the stams between applications of boil ng water may help For coffee spots on wool or silk spongs with lukewerm water Then rub glycenn in I ghtly and allow it to remain half anhour Rinse with water If the coffee contained cream aponge with earbon tetrachforide

Far Oil or Gressa Spread absorbent powder over fresh still damp spots Shake or bru h away the powder when it becomes gummy Repeat as necessary If this method is not successful press the stained mater al between clean white blotters using a warm iron Remove old or stubborn spots from washable fabrics by washing in warm scapsuds. Remove such spots from unwashable fabrice by sponging with carbon tetrachlor de Sponge on the wrong side with an absorbent pad under the right side

Frust Toremove frust stains (ex spt peach pear plum and cherry) from washable fabrics use the boiling water method suggested for coffee sta ne If necessary try hydrogen peroxide acdium perborate or chlorine bleach

Scapy water sets some fruit stains but it may remove apota due to citrus fruit

To remove fru t stains from eilk or wool sponge well with cool water Then rub in a small amount of giveerin or scapless shampoo and allow it to ramain for several hours Next apply a few drops of vineger R noe after a minute or two using clear water. Follow this method for peach pear cherry and plim stains on any fabric

Gress and Other Green Plents On washable material see hot water and soap Rub well On unwashable fabsee sponge the stain with denstured sleohol diluted with two ports of water A bleach may be necessary

Ink Apply absorbent powder to still wat spots Then if the labric is washable apply glycer n or soupless shumpoo ruh I ghtly and runs with water It may be necessary to follow with a bleach Some inks wesh out with soop and warm water For ink on unwashable fabrics consult a

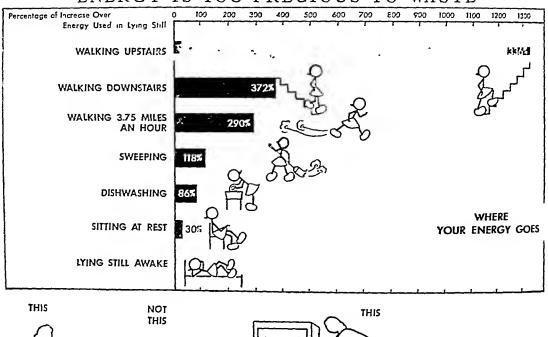
reliable dry eleaner Lipstick Louisn the stain with vesseline Next sponge pawahable fabrics with carbon tetrachloride. If color rems no sponge with alcohol diluted in two parts of water Laundering will usually remove the loosened etsin

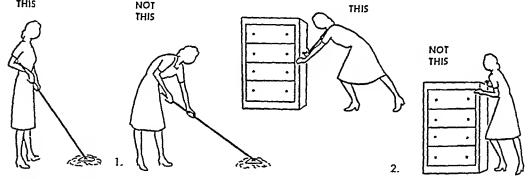
from washabie februs

Scorch Washing with soap and water may remove light search stams For search on whits fabrica follow this if necessary by bleaching in the sun Sponge scorch on other fabrus with sodium perborate and hydrogen per-ounds ex described under Blesching

Tes Follow the procedure for removing coffee stains

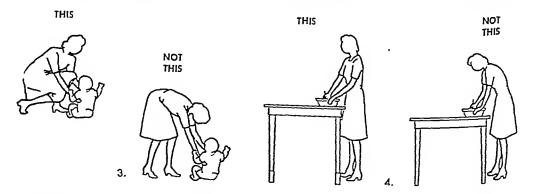
#### ENERGY IS TOO PRECIOUS TO WASTE





Back bending is backbreaking.

2. Use whole bady at center af weight to be moved



<sup>3.</sup> Use leg muscles rather than back muscles.

4. Have working surfaces the right height

As the chart at the top of the page indicates, unnecessary trips upstairs and down are an extravagant waste of energy. Forethought often makes it possible to combine several errands into one trip Unnecessary walking during household tasks also wastes energy. The four sets of sketches helow the chart show right ways and wrong ways of using the body. Right ways conserve energy. Chart and sketches are from the United States Department of Agriculture bulletin 'Posture in Housework'

her time. Fatigue decreases the amount and quality of her work and may lead to accidents (see Work and Fat gue) Boredom frustration hurry worry or magcunty may cause fatigue as well as hard work Shill and confidence on the other hand tend to elummate tiring tenseness Boredom arises from the large num ber of repeated tasks in housework and from the fact that it continues over the seven days of the week

Work simplification methods can save time and therev Motion studies of household tasks have revenled ways to el minate 100 or more steps in a s nele task The homemaker who studies her work . Il find many wass to improve motions. For metan e she can learn to make wider use of the left hand an I can chop a bunch of vegetables on a board instead of eniting a single one in the air. She saves steps when she keeps all tools for a task stored conveniently or carries everything needed on a tray in a backet or on a rolling cart or table. She stores mixing and measur ng spoons bowls beaters and cooking supples near the food preparation area and keeps regularly used dukes near the sink Making one a de of a bed completely instead of walking from side to e de as she

spreads each cover also saves steps Energy 18 conserved by using the larger musclesben ling the knee and lifting with the thigh muscles when picking up a heavy object from the floor or employing the arm mus eles instead of those in the hand and wrist

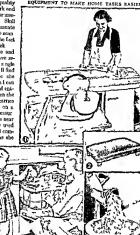
for paring vegetables and similar work Proper tools and soutpment simply work. Sink table and counters should be the proper working height. The work space should not be so wide that the homemaker must stretch to reach supplies Wherever possible she should eit at her work

Guiding Other Workers

Good home management calls for ability in guiding the work of others. It is especially important for a mother to develop uportants of a months to develop .

This can set a hardwood top it used as a thepoint or rolling heart. The mater shall make the bardwood top its used as a thepoint or rolling heart. The ward work. To keep interested children have a get makes could be get as the color to great make the state of the stat mother expects perfect results from a be-

gamer a sense of falure will make him hate housebold tasks On the other hand he may enjoy having respons bility for a job he does well Clear dree tions and an explanation of the purpose and value of EQUIPMENT TO MAKE HOME TASKS EASIER



a task add to its interest. A good home manager uses tact in direct ng and correcting her helpers. She works see ably with them or leaves them to work on etly according to their preference

## REFERENCE-OUTLINE FOR HOME ECONOMICS AND MANAGEMENT

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HOMER The unknown au thor (or authors) who wrote the famous Greek epies the Iliad and the Odvesey gave us the greatest poems of the r kind Herodotus sad that the author was Homer an Asiatic Greek who lyed about 850 ac Other ancient Greek histor ans geve different dates

and lands for h s lirth Trad tion pictures Homer

85 a blind old man wander ng from place to place reciting his poems. Many scholers helieve that these ep ra were not composed by a single person and were not written down until centur es efter they took their present form It is al most certain they were handed down from memory ss there is little evidence that writing was practired in Greece at so early a period. One theory con coming their or gin is that they are the work or com plation of a company of poets who composed and collected in this form the legends of the Trojan War The Ihad and the Odyssey are sometimes attr buted te different writers and somet mes to early and later

penods of Homer a life The Greek war with Troy forms the base of the poems The Ihad tells the story of the wrath of Achiles while the Odyssey relates the many ad ventures of Odysseus (Ulysses) on his voyage home Even though the poems contain only a shadow of historical fact s holars owe a great debt to them for the information they furnish concerning early life in the lands about the Aegean Sea Excavations by He nrich Schliemann and other archeologists on the site of Troy and elsewhere have confirmed the in formation from the poems (see Aeyean Civilizat on, Schliemann)

One does not need to be a scholar to appreciate the wonderful stories in Homer The person who reads the poems in translation or paraphrase cannot miss the charm of the story or fail to be interested in the hero c characters He can follow them through strring battle scenes in the Ihad and through many and strange adventures in the Odyssey Only the

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student of the Greek language can fully apprec ate the sample and lofty beauty of the original the directness and v gor of the winged words and the flow ing music of the long hexameter lines

The best proce translat ons are those of the Ihad by Lang Leaf and Myers and the O lyssey by Butch er and Lang One of the best-known translations in verse s that of Pope but his vers on conveys less of the spirt of Homer The American poet Bryant made a good poetic translation and there are several 20th-century Engl th versons Some of the bestknown Homeric tales may be found in this encyclopedia (See also Ach lies Ajax Amazons Circe Cy clops Hector Odysseus Parie Proteus Troian War ) HOMER WINSLOW (1836-1910) No one has painted the fury of the sea more vividly than has Winslow Homer This American artist first won fame for his magazine draw ngs then turned to paint ng He now rapks as one of the greatest painters of the sea

Homer was born Feh 24 1836 in Boston Mass where his fatler owned a hardware bue neve Six years later the fam ly moved to nearby Cambridge Winslow loved the country life and spent much t me fishing and boating These sports later appeared



Here Homer pauses before his famous water color 'The Guit Stream The picture dramatizes the higher of Marie The picture dramat res the pight of a Negro adult in e rudderless boot.

frequently in his paintings. His mother, an amateur artist, encouraged him in drawing.

At 19, Homer was apprenticed to a Boston lithographer. He learned line drawing, and two years later he opened a studio. In 1859 he moved to New York City. There his first big assignment was to sketch Lincoln's inauguration for Harper's Weekly. During the Civil War the magazine sent him to Union Army headquarters as an artist-correspondent. His camp scenes won him a wide reputation.

At the height of his success, Homer decided to try painting. He turned some of his army-life sketches into oils. Encouraged by the reception they received he gave up illustrating. His first paintings told a story, usually of some everyday occurrence. Art critics of the time considered them vulgar, but today these story-paintings, although not great art, are regarded as valuable records of 19th-century life.

A trip to England in 1831 marked the beginning of Homer's work as a marine artist. For two years he lived in a little fishing village on the North Sea. On his return to America, he concentrated on scenes of nature. He retired to Prout's Neck, a little resort village on the Maine coast. His studio cottage faced the Atlantic and he painted its foaming waters again and again. He usually spent the winter months in Florida or the Bahamas, making water colors of the dark-skinned inhabitants. Homer never married. He died at Prout's Neck on Sept. 29, 1910.

Homer was a self-taught artist whose technique evolved slowly. It was largely naturalistic, but the luminous, intense water colors he produced in his

later years suggested impressionism.

HONDURAS. Nine tenths of Honduras is such a jumble of mountains, hills, and steep-sided valleys that a Honduran statesman once made a crumpled sheet of paper serve as a relief map of his country. The rugged land has hindered the development of this Central American republic. The capital, Tegucigalpa, is one of the few capital cities of the world without railway connections. Road building is so difficult and expensive that work on a network of all-weather roads was begun only during the second World War. A narrow strip of level coastal plain and valley along the Caribbean Sea coast produces its chief source of trade and wealth—bananas.

Honduras, roughly triangular in shape, spreads across a shoulder of Central America jutting into the Caribbean south of the Yucatán Peninsula. Its north coast line extends about 350 miles, while its narrow Pacific coast on the Gulf of Fonseca is only 50 miles wide. Guatemala lies to the west, El Salvador to the southwest, and Nicaragua to the south and east. The republic is separated from the colony of British Honduras by the Gulf of Honduras (see Central America; Yucatán).

The country's area is estimated at 59,161 square miles. The main Central American cordillera crosses it from west to east, sending spurs northeastward toward the Caribbean. The highest peaks, towering to 10,000 feet, rise in the southwest near Lake Yojoa,

the largest lake. The chief rivers rise in the mountains and drain through narrow valleys toward the north coast lowland. The Ulua has the largest volume of water and drains the best agricultural area of the country. The longest river, the Patuca, flows through an unexplored and undeveloped region, the Mosquitia, in the northeast. It is believed to be rich in hardwoods, gold, and fertile land, but it is still a wilderness, populated only by scattered tribes of Indians. The Bay Islands (Islas de la Bahia) in the Caribbean belong to Honduras.

Tropical Climate and Seasonal Rains

Honduras lies within the tropics and the trade wind belt. The lowlands are hot and humid, but temperatures fall with elevation, and the highlands are springlike and pleasant. Tegucigalpa, at 3,200 feet, has an average temperature of 72° F., a maximum of 98° F., and a minimum of about 46° F. The rainy season lasts from May until November. Slopes facing the moist east winds get the heaviest rainfall, and valleys sheltered from these winds are dry.

Tropical rain forests grow on the steaming north coast. The mahogany, primavera, guayacan, and other valuable hardwoods have been cut near settlements, but good stands remain in remote valleys. At higher altitudes, pines are the principal trees. The densest woods are the "cloud forests" growing above 5,500 feet on windward slopes. Here clouds carried by the trade winds have been forced upward until they drop their moisture as rain and mist.

How the People Live

Hondurns, with a population of 1,505,465 (1950 census), is rather thinly settled. About 90 per cent of the people are mestizos, of mixed Spanish and Indian blood. Most of them are farmers in the upland valleys. The people avoided the lowlands until the 20th century, for they were unhealthful as well as hot. Only after fruit companies from the United States cleared and drained the land for banana plantations, eradicated disease-carrying mosquitoes, and supplied safe water and other utilities was the region settled.

About 6 per cent are pure Indians, who dwell mainly in the mountains bordering Guatemala. They live much as their Mayan ancestors did, cultivating hill-side corn patches, called milpas (see Mayas). At Copán, site of an ancient Mayan city, ruins of stone monuments, altars, a ball court, and other structures have been found and partially restored. About 2 per cent are Negroes. Most of them work on north coast plantations. Only a little over one per cent are whites, mainly concentrated in the mining districts and in the north coast towns and plantations.

Honduras has a liberal land policy and it is not hard for a man to get an upland farm. He can rent or buy land cheaply from the government or become an owner by "homesteading" or clearing and improving virgin land. Lumber for a house is plentiful too.

Most farmers raise crops and stock for their own use because market roads are scarce. They grow combeans, squash, wheat, and potatoes. In favorable areas, coffee, small-leaf tobacco, and abaca may



A North American fruit company bu it tha extensive pantation on the coestal pain. Notice the re-n forest beyond the banans rows and the reinclouds nearing the Notice the re n forest e be grown as each crops and hauled to a market town

in an oveart over rutted roads or trails Highland Industry and Transportation The uplands are poorly developed industrially Gold and s lver mining began under the Spanish con qu stadors Other mineral resources include lead cop per z ne iron and antimony but they have been I tile sorked The chief gold and silver mines are near Tegucigalpa. Highways south to San Lorenzo a th its island port Amapala and northwest to Potrerillos term nus of the National Railroad nos permit truck ing of ores that once moved by pack mule Other up and all weather roads are under construction and a 95-mile link of the Pan American Highway crosses narrow southern Honduras Airplane lines are widely

used within the country and to other lands Lumbering of the pine forests has increased with inproved roads A few factories make soap matches lour cloth beverages and other products in every lay use Tegucigalpa (72 385) includ ng Comaya such across the Cholutera River is the main city

Development of the North Coast The development of the north coast lowland is ased on the banana industry. Here the country a mly railroads are used mainly to haul bananas On he coast are the chief ports where bananas the lead ng export are shipped A large proportion of the copie work for the fruit companies whose villages ave schools stores hospitals and other modern

acht es. Independent lowland farmers also raise ananas together with such other tropical crops as ugar cane coconuts and cotton



the tap tot r se above use 18th century cethedral Percu. Morazan before it honors the patriot Gen Franc aco Morazan

The busy ports are Puerto Cortés (12'228) La Cetta (16 645) and Tela (12 614) The factories on the lowlands are located in the port cities and in San Pedro Sula (21 139) the ch of d str but ng center Education and Government

Education is free an i compulsory in Honduras but only about half of the children of school age attend a sel ool because there are few in the rural districts The National University is in Tegucigalpa and there are several normal schools. A school of agriculture supported by a fru t company offers scholarships to

students from the various Latin American nations Honduras s a republic Its president vice-president and members of the Congress of Deputies are popularly elected Only men have the vote Judges and governors of departments are appointed

History of the Republic

Christopher Columbus discovered the Honduran coast on h s List voyage an i landed there Aug 14 1502 After Cortez pushed down from Guatemala in 1524 the Spaniards exploted the precious metals they found Dur ng the 16th and 17th centuries the coast was often attacked by French British and Dutch buncancers The Captainty General of Guatemala which included Honduras declared its independence from Spain in 1821 The area first became part of Mergeo then shared in forming the United Provinces of Central America On Nov 5 1838 Honduras became independent. Over the years it has had its share of revolution and d etatorsh p but it has made prog ress toward economie and political stability (See also Latin America Latin American Literature )

HONEYSUCKLE. The fragrant flowers and colorful berries of this favorite ornamental shrub and vine are attractive to bees and birds. Many of the honeysuckles are climbers. Some are tall, hardy bushes;

FRAGRANT VINE

Japanese honeysuckle (Lonicera japonica) is a climbing vine with white or purplish blossoms and hlack fruit.

others are trailers. The trailers form good ground cover, but the wild species are such sturdy growers that they may become pests.

The trumpet honeysuckle is a popular elimber. It has orange-searlet flowers with yellow eenters, and red fruit. Hall's honeysuckle, with white or purpli-h flowers and orange-red fruit, makes a beautiful cover for fences. Thetartarianhoneysuckle, the most common bush

species, reaches a height of ten feet. In May and June it is covered with rose-pink blossoms, and in the fall with bright-red berries. Morrow's honey-suckle and the fragrant honeysuckle are somewhat smaller bushes. Each one has white flowers. The Japanee-e honeysuckle is native to East Asia. (For illustra-

tion in color, see Flowers.) Among the many wild species which bloom in early summer are the fly and the smooth-leaf honeysuckles.

About 175 species of honeysuckle are found throughout the northern hemisphere. Nearly 100 species and many varieties and hybrids are cultivated. The honeysuckle family (Caprifoliaceae) includes the true honeysuckles (Lonicera), the bush honeysuckles (Dierrilla), as well as elders, viburnums, and weigelas. Scientific name of trumpet honeysuckle, Lonicera sempertirene; tartaman honeysuckle, L. tatarica; fly honeysuckle, L. canadensis; smooth-leaf honeysuckle, L. dioica; Hall's honeysuckle, L. halliana; Morrow's honeysuckle, L. morrowii; fragrant honeysuckle, L. fragrantissima.

HONG KONG. When England in 1841 obtained the mountainous little island of Hong Kong from China, it was a barren haunt of pirates. But its situation had immense commercial and military value. Lying at the mouth of the Chukiang or Pearl River, 75 miles from Canton, it became the chief port of southern China and a main outpost of British defense in the Far East. In its superb sheltered harbor of ten square miles, liners and freighters from every corner of the world anchored beside junks, sampans, proas, and other strange craft of the Orient.

The city which became the center of this thriving commerce is Victoria, on the northwest corner of the island. Built by the British, it is the most European city of the Orient. It is built on terraces up the steep slope of Victoria Peak (1,825 feet). At the foot along the water front is the business dis-

triet, with massive buildings that remind one of London. Here too is the huge erowded Chinese quarter, noisy with sidewalk peddlers and beggars. Stairlike streets lead up the rocky slope. On the upper levels of the mountain, reached by cable cars, motors, rickshaws, and sedan chairs, is the residence section.

On the mainland of China, less than a mile away aeross the channel leading to the harbor, is the city of Kowloon, where the largest liners dock (for picture see Harbors and Docks). Ferries connect the ester cities. A government railway links Kowloon with Canton and other cities of China. There is air service to all parts of the world.

The Colony of Hong Kong includes several small islands as well as the main island and the Kowloon Peninsula. It is supported chiefly by foreign trade. The principal businesses are banking, brokerage, insurance, and similar activities arising from its trade. In addition to building and repairing ships, it prepares sugar and tea, and has small manufactures of such articles as cement, paper, glass, furniture, textiles, and tobacco, chiefly from imported materials. Aside from its fisheries, it is almost wholly dependent on imported foodstuffs. There is a university, with schools of arts, engineering, and medicine.

Hong Kong Island is about 11 miles long and from 2 to 5 miles wide, with an area of 32 square miles.



Rickshaws and sedan chairs are the only vehicles that can travel the steep narrow streets of the Chinese quarter. The street shown here is wide and modern compared with the narrow lanes that make np most of this section

It was ceded to Great Britain after its capture during the Opium War with China (1839-42) In 1860 China eeded the Kowloon Peninsula, and in 1898 leased an adjacent area, the "New Territories" to England for 99 years The entire colony has an area of about 390 square miles and a population of 2 250 000 (1953 est ) About 98 per cent are Chinese

In the second World War it was the first British possession to fall to Japan Dec 25 1941 The Janarese treated the residents savagely. Allied air mids damaged the city before Japan surrendered it in 1945 HOOKWORM The "lazy disease" common in the warm regions of the world including the rural districts of southern United States is caused by the parasitie hockworm. It lives in large numbers in the intestinal tract, where it saps its host's vitality, stunts growth retards mental development, and may even cause death. The larvas develop in soil polluted by the intestinal waste of hookworm victims. They usually enter the body through the skin of the bare feet, passmg in the bloodstream to the heart and lungs, and eventually to the intestines. The parasites are readily destroyed by certain drugs and the wearing of shoes will prevent further infection Eradication of the hookworm however requires the cooperation of entire communities in sanifation and personal hygiene Hookworms belong to the genera Necator and Anky lostoma, of the class Nematoda, or round worms

#### PRESIDENT of the UNITED STATES The 31st

HOOVER, HERBERT HERBERT Probably no man in public life during the first World War and the years unmediately after it has been the subject of more legend and story than Herbert Hooser The name of this reticent Quaker was known to few outside his own profession in 1914, but four years later it was famous the world over

The influence of heredity and his boyhood environment are strongly marked in Hoover's character. The Hoover family for at least six generations were Quakers, of Swiss origin, tradition says The first American Hoover was Andrew, who owned a farm in Maryland about 1740 The Hooser family followed the American frontier westward until finally they reached Iowa and with other

and became the village blacksmith Herbert, one of three children, was born at West Branch on Aug 10, The summer after his father's death, when he was six years old, Herbert visited his Uncle Labon who was government agent for the Osage nation in the Indian Territory He learned from the Indians a woodcraft that any Boy Scout might envy Years later he would relax from the strain of official life by

Quakers founded the town of West Branch Here

Jesse Hoover, Herbert's father, abandoned farming

going into the woods for a day's camping building his fire Indian fashion, and doing his own cooking Herbert's mother, Huldah Hoover, an intelligent, efficient woman, better educated than most women in ber community, died when he was nine He lived with an uncle, Allan Hoover, on a farm in Cedar County,

HOOVER

Iows, for two years and then was sent to Newberg Ore, where his mother's brother Dr John Minthorn had founded a Quaker commu nity and opened an acad emy When Herbert was 14 and ready for high school, his uncle moved to Salem, Ore . and took the boy with him to act as hookkeeper and office

Inspired by a conversation with an engineer about mining and about the new Leland Stanford Junior University, Hoover determined to become a mining engineer and entered the university in 1891 In col lege he did well in mathematics and the sciences To pay his expenses be at various tunes delivered newspapers served a laundry route, did

clerical work and was secretary to Prof John C Branner, head of the department of geology Each summer he did surveying Out of his hard won lessure he gave con derable time to student activities The present student constitution was largely his work, and he himself was the first treas prer of the student body

Career as an Engineer

Leaving Stanford in 1895 with a sound theoretical training Hoover went to Nevada City to get some practical experience His first job was pounding a drill, shoveling ore, and pushing a hand ear for \$2.50 a day Soon be had a real job as assistant to the superintendent of properties in New Mexico and Arizona, and just before he was 24 came his first great chance Through his employer he was offered the task of introducing American mining methods into the newly opened Coolgardie gold fields in Western Australia

Thus began a career as mining engineer which in the

next 15 years took Hoover to the far corners of the earth. He returned from Australia in two years to marry Miss Lou Henry, whom he had known at Stanford; and left with his bride on their wedding day for China, to organize a national department of mines and railways. His explorations proved that northeastern China has the world's greatest coal deposits During the Bover Rebellion, which ended this work, he and Mrs. Hoover were among the 200 foreigners who were besieged in Tientsin. In 1901, while conditions were

still greatly disturbed, Hoover for a few months ran a large coal mine near Tientsin for its

foreign owners.

For the next 12 years Hoover spent gradually more and more time each year in the United States. As his company grew and became better known, he and his associates realized that it was a waste for him to work solely as a technical expert, and he became a reorganizer of "sick companies."

Technical Achievements

Hoover's technical achievements in the period were many. In Australia he and his brother Theodore worked out a new process of recovering zinc from the refuse dumps of the lead and silver mines. In the wild, rugged Altai Mountains of southern Siberia, he had a problem in pioneering, building roads and railroads, assembling machinery, and arranging finances before vast stores of metals, especially zinc, could be opened. In Burma he attacked a mixed deposit of base and precious metals re-

quiring new methods both in chemistry and in engineering. In his scanty leisure time, he wrote the textbook 'Principles of Mining', long a standard in the colleges. Wherever he went, politics was mixed with engineering; so, when suddenly he was faced with a world-wide responsibility, he was no stranger to premiers, foreign ministers, ambassadors, and their

various ways.

When the first World War broke out in 1914, Hoover was in Europe procuring exhibits for the Panama-Pacific Exposition. At the request of Walter Hines Page, United States ambassador in London, he undertook to help some 200,000 American tourists, most of whom were left without funds, to return home. His organization cashed checks, made steamship reservations, and raised the funds for those who had no money. By the end of September the job was done.

Then, when Hoover was about to sail for the United States, he was persuaded to undertake the task of Belgian relief. The German armies were using Bel-

gium as a base against France, and the little country. held in the grip of a blockade, seemed doomed to starvation. Hoover promptly severed all his business connections, lest they interfere with the work before him. His many interests at that time promised to make him one of the world's richest men, but he turned them all over to his associates.

Head of the Belgian Relief Commission

There were 10 million noncombatants in Relgium and northern France to be fed. After overcoming the

HERBERT HOOVER'S ADMINISTRATION 1929-1933

Federal Farm Board created (1929). Federai Radio Commission (1929). Financial Crisis and Beginning of Depression (1929).

Naval Treaty of London (1930). Claims against Germany reduced (1930).

Hawley-Smoot Tariff Act (1930). Department of Justice takes over Prohibition Enforcement (1930). Veterans' Administration formed (1930).

Federal Power Commission strengthened (1930). Tariff Commission reorganized (1930).

Soldiers' Bonus Bill (1931). Wickersham Commission report (1931).

German and Interallied Moratorium (1931). Federal Unemployment Commission (1931).

Reconstruction Finance Corporation and Other Relief Measures (1932).

Great Lakes-St. Lawrence Seaway Treaty with Canada Negotiated 20th Amendment Adopted (1933).

objections of both the Germans and the Allies each of whom saw an advantage for the other side in the plan, Hoover organized the Commission for Relief in Belgium. He sought and obtained funds for this gigantic task from charitable people everywhere and from the govcrnments of France, England and the United States. In his work he went from London to Paris, to Brussels, to Berlin, from Allied headquarters to German headquarters. He posessed information about each combatant which would have been priceless to the other. He was a trained engineer, a practised observer of such matters as terrain, roads, and excavations. Yet never once did he let shp any information which could aid one side against the other.

After the United States broke with Germany, Hoover turned the work over to the Dutch and Spanish. By the end of the war, the Commission had sent a total of five million tons of food and clothing to occupied Pelgiumand

France. Hoover drew no salary and, like many other workers during the war, paid all his own expenses.

United States Food Administrator When the United States went into the conflict, in 1917, Hoover was made food administrator. The law creating the Food Administration was drafted with his help. It was his task to see that the country produced and saved enough food to supply its allies in the war. About 14 million families pledged themselves to his programs. His name was a house hold word; to "hooverize" meant to save, to substitute, to practise self-denial and help win the war.

When the war ended, Hoover saved the American farmer from financial ruin by persuading the Allies to buy some of his surplus food. As head of the Supreme Economic Council, established by the Peace Conference, Hoover directed the distribution of food to the starving peoples of Europe. His organization of American businessmen and engineers from the army reserves not only saw that food reached the starving

nations but helped to open traffic on railroads became fuel administrators fought typhus epidemics and started the whoels of commerce which had been idle Finally after the peace Congress appropriated mil bons to feed Europe a undernourished children but

st pulated that no money should be spent in former enemy countries Then Hoover sent for the leaders of his own people the Quakers and persuaded them to assume the task of feeding the German children

In 1921 Pre dent Harding appointed Hoover secretary of commerce In seven busy years Hoover made his department one of the most effic ent governmental organizations in the world. He established in the Bureau of Standards a new division of simplified practise which has saved American manufacturers in Il one of dollars a year. He had long foreseen the need of government control of rad o and he himself worked cut the main princ ples which Congress followed in controlling rad o broadcasting. For civil aviat on he norked out a program of government support with ighted air routes landing fields and charts and placed the work under a new division of aviat on

Election to Presidency

Among the possible successors of Pres dent Cool sige the name of Hoover met with most favor. He had been mentioned as a poss bility in 19°0 but he had then been too slightly ident fied with either pohtical party to be available. He had now behind him seven years of service in a Republican cabmet and a better training in successful priva e life and useful public life than any new presidential nominee since Washington He was named on the first ballot at Kansas City with Charles Curtis for vice-pres dent

The Democratic Party made an issue of the scandals that had marred the presidency of Harding They nominated Gov Alfred Emanuel ( A) Smith of New York an avowed wet a Roman Catholic and a man so able that the Republican Party was forced to present a first-rate candidate. The Republ cans promised to maintain prosperity to assist the farmer and to make a better attempt to enforce the dry amendment and law in general. The South Isreely Protestant and dry turned against Smith, so that he carried only six states of the lower South he won but two elsewhere Massachusetts and Rhode Island Some three of every five votes cast went to Hoover giving hun the most

smashing victory up to that time Foreign Policy

Before organizing his new administration in 1929 President-elect Hoover indicated that his would be a inendly foreign policy Traveling on the battleship Maryland, he visited the Latin American countries continuing the good work done by Pres dent Coolidge at the Pan American Conference in Havana m 1928 As President in 1930 he arranged a conference on the limitation of armaments in London he sent a delegation to a League of Nations disarmament conference in 1332 he urged American partic pation in the World Court. And in 1931 he persuaded the European na tions to join the United States in a general morator um by which payments on the r debts to each other should be deferred for a year in the hope of advancing general prosper ty But in sp te of good will the world advanced little toward peace. Europe remained upset in its business and pol ties while in Asia, Japan separated Manchukuo from China in 1931 in spite of the pledges that had been recorded in the Kellogg Pact.

Economic and Pol tical Progress

Alone among the nations the United States rode on the crest of a wave of prosperity which had been mount ng stead ly smce 1921 There was money to spend and money was spent. The national debt was reduced without increasing taxes. Cit es were rebuilt with new stores and office buildings and new homes Automobiles became more numerous and rad o sets found buyers m nearly every family Conveniences in the home and labor-saving machinery in the factory were mult plying The Ohio River channel was deepened and construction was begun on the great Colorado River improvement at Hoover Dam. The cap tal city Washington was yearly increasing in magnifi cence Before he left office Hoover laid the corner stone of a much needed National Archives Building

Progress was made in public affairs The national hadget system set up during the Harding administrat on improved the management of public money matters The Veterans Bureau and the Pension Office were reorganized and merged. As mught have been ex pected from his previous record the Pres dent worked continually to maprove the working efficiency of the government Besides lending his support to a study of the organ zation of all government offices he appoint. ed commis ions to survey social and economic frends in the United States to study law ob ervance and en forcement (the Wekersham Commission) and for many other purposes And he held conferences of bus ness and profe sional leaders on matters pertaining to the public welfare such as the White Housa Confer ence on Child Health and Protect on

Congress reapportioned its members among the states in 1999 and the 20th Amendment to the Con stitut on was proposed and later ratified. This clim insted the interval when lame ducks remained in off ce after their successors had been elected (see Con gress) It advanced the date for the meeting of a new Congress to January 3 following the elect on and the date for the manguration of the pres dent to January 20 Still another amendment, the 21st to repeal the 18th (dr.) Amendment was sent out to the states as Hoover left office The willingness to try to enforce prohibition which had prevailed in 1928 had given way to a desire to get rid of it

Difficulties of the Farmers

But the general prosperity spectacular and intox scating as it was was not sound The farmer c t zens let down from the crest of h gh prices for their produce and high land values prevailing in the first World War lagged behind the rest of the country W th improved machiners the farmer could raise more food with fewer hands each year But he could not sell it at a profit

Europe was too poor to pay for American food unless Americans lent the money with which to huy it; and the American market could not absorb the total pro duction at normal prices. Prices kept falling. Farmers could not pay off their debts, and banks and insurance companies that had lent money on farm mortgages could not collect what was due them. After the war the farm interests organized to press their demand for relief. New political parties were started, but more generally the farmers demanded, through the existing parties, that the government pass laws to keep the surplus food and cotton, unsalable abroad, from being dumped back into the home market to break the price. Congress was not able to agree upon the terms of such laws; nor were the farmers themselves in agreement upon the sort of law they wanted. But they asserted that Congress had long protected the manufacturer by a tariff on imports, and asked equal consideration for their own interest and safety. And it was certain that unless safety could be hrought back to the farm, the welfare of the whole country would be in danger.

In the campaign of 1928 Hoover had promised that immediately after his election he would call upon Congress to pass a farm act, and to revise the tariff schedules so as to protect the farmer. In June 1929 an Agricultural Marketing Act received his signature. He did not believe that commodity prices, which depend on the balance hetween supply and demand, can be fixed by law, hut approved the creation of a Federal Farm Board to help move the crop and to try to keep the surplus off the market. Congress allowed \$500,000,000 for this effort. But in spite of all the Farm Board could do, the price of farm products kept on falling. The farmer was left dissatisfied; and before the year was out, calamity struck the whole United States.

Conditions Leading to the Depression

Little is really known about the cause or cure of panics. At rather regular intervals for more than a century the United States has suffered from a collapse of business, followed by unemployment and spread of poverty. In every case, several years of deep depression and stagnation followed a crisis. And in every case the people climbed slowly back into prosperity without quite knowing why. Every collapse was preceded by years of extravagant earnings, during which, after provision was made for food, clothing, and housing, there was plenty of money left for enjoyment or for waste or for permanent investment. Civilization keeps going on the capital that is saved from day to day, to be used for future benefit. If this surplus of wealth is consumed in extravagance, wasted in war, fire, or calamity, or even invested unwisely, the margin that separates comfort from poverty is narrowed. The United States in 1921-29 produced heavily, piling up a huge annual surplus above the costs of immediate maintenance. But personal extravagance wasted much of this. The cost of the war had to be met from it. It financed Europe in the war and after, and Europe could not repay. Much of it was sunk in unwise investments. And when Europe stopped buying, income dropped; and

the revenues out of which hoth maintenance and the surplus must be cared for, fell away.

At the same time, the nation ignored danger from the constant replacement of man by machinery. Every new labor-saving device lessened the demand for labor If there had been no other cause for unemployment, the lack of jobs following "technological change" would alone have created a huge burden upon American society. The cutting off of most of the immigration from Europe hy laws in 1921 and 1924 reduced the number of workers, but there were still more workers than jobs. Wage-earners crowded from their positions must be reëducated and cared for until they get new jobs; and children growing up must find work or become a menace to themselves and to society.

But through the years of "Coolidge prosperity," which was expected to continue through the Hoover administration, little regard was paid to the threats against the future. There was a minor panic in 1921, causing Hoover, then secretary of commerce, to warm business that "if the future is like the past, such periods will recur." But few people realized that the United States was heading into another of the troughs hetween two booms. The financial reserves were being drawn upon more heavily than they could hear, yet business remained optimistic.

Panic hroke out in October 1929. Business had been conscious during the summer of a falling-off of buyers Automobile sales had declined, but advertising was rehed on to hring the huyers hack. Within a few days after the stock market had reached the highest level

known, there was a complete slump.

The effect of the collapse of the hoom spread rapidly to every level of society. The promotion of new business ceased. People with dehts to pay could not raise the necessary amounts by selling their securities. Fearfollowed hope; and because of fear those who still had cash refrained from spending it. Buying stopped and dealers could not move their goods, retain their help, or pay their hills. Factories, unable to collect their debts or make new sales, laid off more hands. The unemployed lived as best they could on their savings, borrowed on their insurance, sought in vain for jobs, and felt the fear of charity. And upon the farmer, who is the ultimate producer, who was already badly enough off when the rest of the country was prosperous, fell still more burdens.

For the next three years American life went from bad to worse. The bottom of the trough had not been reached when the Hoover administration approached its end in the summer of 1932. It was now known that, in addition to the necessary consequences of depression, business was suffering also from the wild speculation and the misuse of other people's money of which some industrialists had been guilty during the boom

Every administration in office during a panic is held accountable for the suffering, and Hoover was blamed for this misfortune. Burdened to devise untried means to bring about recovery, he had to face defections among his political friends and active hostility from

his political enemies. He was not a professional noli tician and was never much liked by these who were As a successful engineer he knew how to chart a course upon its merits. But every politician knows that gov. ernment cannot do even right and obvious things un less the voters will sustain it

A husiness man Hoover was not over nonular with big business for he believed that it ought to be gov erned in the public interest and it prefers to be left alone A somewhat diffident man he was not com pletely at ease in public and lacked the marnetic power to charm and to persuade that a area dent needs and Austria were bankrupt. To retard the decline and avert possible collapse Hoover in June persuaded Europe to assent to a one-year moratorium But in apite of this England was forced to suspend gold pay ments in September and much American gold was drawn out of banks to be hoarded by nervous owners

Local government treasures were nearly empty from the drain caused by relief expenditures and from falling tax collections Private charitable agencies were overburdened Private savings were giving out throwing more persons on relicf And the new Con grees faced both the need for emergency laws and the

DISARMAMENT CONFERENCE PROMOTED BY HOOVER



e Amer can delegation a et the extreme

as he explains to the people the measures he advocates He could not escape the depression and its consequences and he was handicapped in two ways No American government had ever relieved a pamie or known how to and no one in 1929 could imagine the depths that would be reached in 1932 Relief Measures

Hoover called the key men of business to Wash ington at once urging them not to lay off hands or cut wages He begged the states to create jobs by starting public works He encouraged the leaders of local com munity chests. The states had relieved their own suf laring in the past and he believed it would be un American for the Federal government to do it now But when severe drought came in 1930 he approved an appropriation and a relief commission to help the people on the burned-out farms. The Congress had no clearer view of the future than the President had It lagged behind him and even deserted him to pass the Hawley-Smoot Tariff This was attacked as forgetting the farmer for the sake of the manufacturer

Dismay at the depression turned into criticism of the Republican Party for doing so little about it In the November elections of 1930 Democrats esptured the House of Representatives for the first time in 14 years so that during the last half of his administration Hoover had to face a divided Congress

Before the new Congress assembled in December 1931 a world economic collapse was in sight Germany temptation to play politics with the approaching election of 1932 in view

Hoover still coposed appropriations for direct fed eral relief but he approved increased expenditures for public improvements At his urging Congress created a Reconstruction Finance Corporation to lend money to banks insurance companies and railroads so that they might not fail Before the administration ended more than two billion dollars was advanced to such companies Loans to them safeguarded the say mes and investments of millions of ctizens but brought the charge that the government was too fr endly to big business The Emergency Rebei Act of 1932 permutted Federal Reserve Banks to lend someshatmore generously for the same purpose It also proyided for RFC loans to states for use in d rect rel ef Home Losn Banks were established in 1932 to lend money to persons who were in danger of losing the r homes through the foreclosure of mortgages

But while Hoover urged upon Congress more relief laws than it would pass he urged fewer than many leaders demanded The pressure of poverty made him enemies and his stand on certain measures such as the Soldiers Bonus Bill had already made him un popular with various large groups This bill which raised the maximum loans on veterans 20-year insur ance certificates from 221/2 per cent to 50 per cent of the face value was passed over the President's veto In 1932 the President further incurred the resentment of many veterans hy ordering from Washington the "bonus army" who had come there to demand

immediate payment of the honus.

Meanwhile there were more huge failures, some of them scandalous, involving hanks and utility companies. In the agricultural West a Farm Holiday Association was launched to withhold food from the cities until prices rose.

## Defeat in 1932

With the depression at its darkest, the presidential election got under way. Hoover and Curtis were renominated, without enthusiasm. The Democrats selected the governor of New York, Franklin Delano Roosevelt, with John N. Garner of Texas, Speaker of the House, as vice-president (see Roosevelt, Franklin D.). Hoover was crushingly defeated.

The lame duck session of Congress, 1932-33, was dismal. On December 15, the day for payment of European war dehts to the United States, several nations refused to pay. At home frightened bank depositors tried to withdraw their money in gold. Gold hoarding drained large sums from the Treasury of the United States. Many hanks closed, and states de-

clared hank "holidays" to save the rest.

Aid was sought from the Federal government, but Hoover could do little. His party was split. The Democratic House preferred to put off remedial legislation until Roosevelt should he inaugurated. And Hoover, although he tried, could not find a hasis on which the President-elect would cooperate with him.

No administration had begun more happily than his in 1929; none ended in such despair. Retiring to his home in Palo Alto, Calif., on the campus of Leland Stanford, Jr. University, Hoover kept his silence for two years. Then his frequent criticism of New Deal measures again brought him recognition as a force in the Republican party. In 1940 he won some votes for nomination as president. But his chief role was that of "elder statesman" and adviser. Also in 1940 the Hoover Library on War, Revolution, and Peace was built at Stanford. This Library housed Hoover's invaluable historical records of the first World War.

During the second World War Hoover again worked as a humanitarian. Poland and Finland named him director of American relief efforts on their hehalf. After the war in 1946, as honorary chairman of the Famine Emergency Committee he flew to Europe, Asia, and South America to survey food needs and supplies. In 1947 he was appointed by President Truman to investigate food requirements in Germany.

In 1948-49 President Truman placed him at the head of a commission to recommend changes that would promote the efficiency and economy of federal agencies. After the Republicans returned to office in 1953, President Eisenhower appointed him chairman of a commission on organization of the executive branch of the government.

HOPS. When the green conclike blossom clusters of the hop vine take on a yellow tinge and rustle like paper flowers, the hop grower rushes his pickers into the field. The value of his harvest depends

on gathering this flower-fruit in the nick of time. The yellowish aromatic resinous substance called "lupulin," which is contained in the fruit, deteriorates rapidly, and it is this substance which gives hops their medicinal and industrial value.

The hop vine is a perennial climber. Each year it produces several twisting stems that reach a length of 15 to 20 feet. The vines do not grow horizontally but cling to upright poles or wire. Hop vines always twist

in a right-handed spiral.

There are male and female plants, hut the best hops come from fields where only female plants are grown. This prevents seed production, which would detract from the value of the fruit. Plants grown from seed are not true to type; therefore hops must be propagated by root cuttings or by sets.

The principal use of liops is in making beer and other malt beverages. Bohemia is noted for the excellence of its hops. The British Isles and Germany are large producers. Most of the United States crop

is grown in the Pacific coast states.

The hop belongs to the nettle family. Its leaves, with 3 to 7 lobes are heart shaped. The flowers grow in panicles. The scientific name is Humulus lupulus. HORMONES. Now and then nature seems to make a mistake and a hoy or girl grows so far beyond average size as to hecome a "giant." A boy may pass the 8-foot mark before he is 18 and weigh close to 400 pounds. Most of us have seen such people in circus side shows as "freaks." But they are not freaks. They are human beings, otherwise normal, whose pituitary gland has been working too energetically.

The pituitary is one of the ductless glands. Thee glands take material from blood and lymph and make chemical compounds that have an important effect on growth and other functions. The compounds are called hormones, from the Greek verh hormaein,

meaning "to set in motion."

Ductless glands have no openings, or ducts, through which to send out hormones to other parts of the body. But they contain many tiny blood and lymph vessels. The glands obtain material for making hormones through the thin walls of these vessels, and send back the manufactured hormones into the hlood stream and the lymphatic circulation (see Blood). The blood and the lymph then carry the hormones to the organs upon which they act.

When a gland does not work as it should, the effects are felt in whatever part of the body the particular hormone controls. When there is too little hormone, a doctor may he able to remedy the condition by administering a hormone preparation. This may be an extract made from animal glands, or it may be a synthetic substitute—a medicine that has the same chemical formula as the hormone. When a gland produces too much hormone, a surgeon may be able to remove a part of the gland. This decreases the output of the hormone.

The Pituitary and Growth

The pituitary is a small gland suspended from the base of the brain by a thin stalk. It weighs only

05 to 06 gram (0 017 to 0 021 ounce) in grown men and somewhat more in women Its anatomical name is hypophysis, from a Greek word meaning "offshoot" A hormone from the pituitary controls growth If

for any reason the gland becomes larger than normal it makes too much growth hor-

mone If this happens during childhood or youth the entire body continues to grow beyond normal size The person becomes big all over-a giant If overstimulation occurs after growth is complete, certain parts of the body start growing again, particularly the hands and feet and the bones of the face. This condition is known as acromeraly ("large extrematics')

If something reduces the output of hormone below normal before a boy or girl has finished growing. growth slows down or stops The person may become a dwarf Fortunately such disturbances seldom occur

#### The Master Gland

The pituitary makes other hormones besides the one that controls growth These stumuiste and control other glands, particularly the thyroid, the reproductive glands, and the adrenal glands One of these, ACTH (adrenocorticotropic

hormone) gives promise of being a remedy for arthri tis It stimulates the adrenals to produce more of the hormone called cortisone or compound E This for reasons not yet understood, seems to help patients with arthritic Because its hormones stimulate other glands, the pituitary is sometimes called the "master gland "

The pituitary is divided into a front section (anterior lobe) and a rear section (posterior lobe) The antenor lobe makes the hormones mentioned so far The posterior lobe makes a hormone that controls the output of urine A deficiency of this hormone causes diabetes insipulus a disease in which there is more urine than normal Injections of a posterior lobe solution (pitressin) made from the glands of animals remedies this condition

#### The Thyroid Controls Energy The thyroid has two lobes joined by a band of tis-

sue It is in the neck, with one lobe on each side of the trachea The band that joins them hes across the tront of the trachea Each lobe is eval The entire gland weighs about an ounce

Hormone from the thyroid controls the rate at which the body changes food into energy. When the gland does not produce enough bormone, the body develops

energy slowly Its activities are sluggish. This state is calle I hypothyroidism If it is very severe in infancy and lasts during childhood, the individual is a cretina dwarf with low mentality If it develops during maturity and is severe, he becomes dull mentally, he may ORGANS THAT MAKE HORMONES

be overweight his heart rate is slow and his skin is puffy and thick This condition is

#### called myzedema Help for the Thyrold

Doctors have been successful in treating cretinism and myyedema with thyroid substance from the glands of animals and with thyroxin the active prin ciple of the thyroid hormone They may give iodine for milder hypothyroidism Icdine is an essential part of the hormone (see Iodine)

Excessive output of thyroid hormone produces hyperthyroidism Then the body uses up energy too rapidly The person is usually thin, nervous. and evertable, with a fast heart rate A surgeon may be able to relieve the condition by removing part of the thyroid gland, so that it will make less hormone Radioactive iodine may also prove to be a remedy A large part of sodine that is swallowed goes to the thyrotd gland to become part of

PINEAL BODY HYPOPHYSIS (PITU TARY) THYROID-ABATHYROIDS (FEMALIE) REPRODUCTIVE GLANDS (MALE) This diegram indicates the location of the duciless glidds and other ergans that make hermonic Facility the gruchings are abown larger in proportion than they actually are Those represented by crosses are present according to an

the thyroid hormone If the sodine is radioactive, rays emitted in the gland tend to destroy part of the fissue

Gotter is an enlargement of the thyroid gland. The gland may grow large m an effort to compensate for some defect that has kept it from making enough hormone If the effort is successful, the person has a goster but has a normal amount of thyroid hormone If the effort is not successful, there is goiter with hypothyroidism On the other hand, the original disturbance may have been enlargement of the gland In this case the gland secretes too much hormone There is gotter with hyperthyroidism

The doctor usually measures a patient's basal metabolic rate to determine whether his thyroid is working normally Since thyroid hormone controls the changing of food into energy or heat a low basal metabolic rate indicates an underactive gland and a high rate an overactive gland

#### Glanda That Control Calcium

The parathyroids are pen sized glands set into the back part of the thyroid gland or near it Usually there are four, two on each side, but there may be one or two more or less

The parathyroid hormone regulates the balance of calcium in the body Too little of the hormone lowers the calcium level in the blood. Too much raises this level, depriving bones and teeth of calcium.

## A Hormone for Emergencies?

The idea that during fear or other emergencies adrenalin is poured into the blood stream is a popular one. This hormone is believed to raise the blood pressure, increase the heart rate, and otherwise prepare the individual to meet the emergency.

The glands that make this hormone—the adrenals—are located just above the kidneys. The right one is triangular and the left one half-moon shaped. They vary greatly in size, but the average is from 0.12 to 0.17 ounce. Each gland has two distinct parts: the inner medulla, and the outer cortex.

The medulla makes adrenalm. During ordinary times it makes and releases small amounts that have no known effect on the body. During stress it may produce larger amounts, and these may have the effects suggested. But this has not been proved. Nevertheless, hypodermic injection of prepared adrenalm (also ealled epinephrine) does stimulate the heart and the sympathetic nervous system.

The adrenal cortex makes several substances that are thought to be hormones, including cortisone. Their function, however, is even less well understood than that of adrenalin.

# The Pancreas: Two Glands in One

The pancreas is both a gland with a duct and a ductless gland. It is situated just below the stomach. In shape it is like a bunch of grapes, 5 to 6 inches long, resting on its side. The broad part is at the right. The duct empties into the duodenum, the first part of the small intestine.

The pancreas has two kinds of cells. One secretes a digestive juice. This leaves the gland through the duct (see Digestion). Scattered through the gland are cells of another kind grouped in clusters like little islands. These are the islands of Langerhans, named for the man who discovered them. They secrete a hormone, insulin, into the blood.

Insulin regulates sugar metabolism. Lack of it causes diabetes mellitus. In this disease the body cannot make normal use of sugar or of the proteins which digestion changes into glucose. Great quantities of sugar appear in the blood and urine. Interference with the use of fat is a secondary effect. Diabetes mellitus was once fatal. Now it is controlled with insulin from the glands of animals.

The duodenum is not a gland, but it makes a true hormone, secretin. This stimulates the liver to form bile and the pancreas to form pancreatic juice.

The reproductive glands (ovaries in the female, testes in the male) function, like the pancreas, both as ductless glands and as glands with ducts. The cells of new life originate in them. So do various hormones that are secreted into the blood and lymph. These hormones affect the development and functioning of the individual as male or female.

The pineal body is sometimes included among the ductless glands, but it serves no known purpose. It is a cone-shaped projection about 8 mm. long at the

center of the brain. The 17th-century French philosopher René Descartes believed that it was the dwelling place of the soul. Many scientists believe that in some remote ancestor of mammals and man it was a third eye.

The thymus is also a puzzle to physiologists. It is irregular in shape, with two unequal lobes. It is largest at puberty, when it weighs about 1.2 ounce and lies partly in the chest cavity and partly in the neck. Then it grows steadily smaller, withdrawing from the neck. It was once thought to influence growth, but no connection has been proved.

## Other Names for the Ductless Glands

The ductless glands are also called glands of internal secretion, because the hormones they make do not leave the interior of the body, as the secretions of other glands do (see Gland).

A third name for them is endocrine glands. Endocrine comes from the Greek words endon, meaning "inside," and krinein, meaning "to separate." (The glands separate substances from the blood.) The study of hormones and endocrine glands is endocrinology.

HORN. There are two kinds of horn, one the continued growth of bone, the other a hardening of the epidermis. Corns that grow on our toes, the hard spots on a camel's knees, the tortoise's shell, the scales of snakes and lizards, birds' beaks, horses' hoofs, the horns of shccp and cattle, and the fingernails and toenails of man and animals, are the latter, or true horn. It is closely related in growth and composition to hair, and is made up of about 50 per cent carbon, with hydrogen, ovygen, nitrogen, and sulpbur.

The deer's horns or antlers are examples of the first kind of horn, which is really a bone outgrowth. During the growing period such horns are covered with a sensitive velvety skin, which later peels of, leaving the hard, solid antlers. These are usually shed once a year. Beneath the sheath of true horn in the case of oxen, sheep, and antelope, are frontal bone outgrowths constituting a core. Except for those of the pronghorn antelope, such horns are never shed. Neither are those of the giraffe and the rhinoceros, which are thickened hardened masses of skin and hair, covering independent bones. Horns may be solid or hollow; in the latter case they are usually found on the female as well as on the male.

Primitive man used horn for weapons, drinking cups, and handles; then later for powder horns and musical horns. Since true horn can be softened and split into thin sheets which are tough, pliable, and easily molded, many articles both useful and ornamental have been made from it. By a dexterous mixing of dyes, common horn can be made to look like expensive tortoise shell. Formerly thin horn plates were used in window-panes and lanterns, and horn is still used in making combs, buttons, and handles for umbrellas, canes, knives, and forks.

HORN, Musical. When a musician or concertgoer speaks of "the horn" he is referring only to the French horn. Popularly, however, brass instruments of all kinds are often called horns. Except for the

savophone these instruments all consist of a tapered metal tube with a mouthpiece at one end and a flaring bell at the other. For convenience and appearance the tube is twisted and coiled in various ways but this has no effect on pitch and little on tone quality.

To produce tone the player tennes and hashes them withrest and makes them valtered and makes them valtered in the season of the season where the season was to a muscal tone by the tube and bell in the hugle the sumplest brass in strument the various notes are produced solely by changing the endowchire (position and tenneon of the high). These notes are few and at odd intervals. In most brasses valves are used to obtain the full chromatic scale. These have the effect of length cauge the tube and lowering open

tones from one to ax semitonee. The French hom owes its graceful called shape to the fact that it was once a hunters hom Straightened out it is about 16 feet long. The modern hom is fitted with three ro-tay valves to make the full chromatic reals. It is an extremely difficult maximum to play as the slightest wration in embouchure causee false notes. In the orchestra homa are den paura one player taking it has med in paura one player taking it has med in paura one player taking it.

upper register and the other the lower The tone of the horn is pure full and extremely awest. Hence the mistrument is more closely associated with the wood winds than with the other brasses

The other common brass instruments of the sym phony orchestra are the trumpet the trombone and the tuba. The tube of the trumpet is about eight feet long and only three eighths of an inch in diameter until within 15 inches of the bell There are three valves of the piston type. Its narrow tube gives the trumpet a brilliant and penetrating tone. The slide trombone has no valves. It uses a U-shaped part of the tube which slides in and out to vary the pitch of open tones. The rich resonant voice of the trom bone is due partly to the fact that it has none of the short twists and crooks which valve instruments have The valve trombone used sometimes in military bands has an inferior tone. The bass voice of the brass section is supplied by the tuba. It is an in strument of the saxhorn family introduced by Adolphe Sax in 1845 These brasses are characterized by broadly flaring tubes and very resonant tone (See also Orchestra )

Mil tary hands employ many brases not used in symphony orchestras. The cornet and fluegelhorn for example are trumpetlike instruments. The alto horn and barntone horn or euphonium are types of eav



be melancholy notes of the a penborn acho across the walter as a Swiss mout meet per cea an old tune. Alpenborns or alphorns made of bollowed woo meet per cea an 12 just leav. They are sometimes used 10 call cow hom

horns The mellophone is often used in place of the French horn and the sousaphone in place of the tuba The saxophone is a hybrid a brass instrument with

reed mouthpece (See also Muscal Instruments) HORNBHIL Great beats communited by bony creats or belinets and prominent eyelashee distinguish these strange bulky brind; (Biererdakee) of Africa and the Malay region Their food consists manally of first and unsects Those of the larger species (about four feet long) also kill and eat the harders person and the second of the second of

Horster Several large members of the wasp full up are called horster Ethey are social nestes build up nests of paperlike pulp. Their thick bode as reasually black or dark hown marked with brilliant white or yellow. This coloring has earned for some of them the name yellow jackets. If their nests are attacked they show so untable a disposition and sing these attackers no pamiliar and as a home. The state of the state o



Poco Bueno, a Champion Quarter Horse Stallion, and His Rider "Cut Out" a Calf

# MAN'S Friend and Servant, the HORSE

HORSE. For their work and play men use horses in many ways. With them cowboys herd cattle and farmers pull plows and harvesting machinery. Horses aid the Texas Ranger and the Royal Canadian Mounted policeman to keep law and order in the wilds. Gentle little horses called ponies carry children on their backs, and bigger, more lively ones carry pleasure riders over the cinder paths of city parks and country trails. At race tracks spectators cheer as fast horses thunder down to the finish line, and at the circus audiences applaud the performance of trained horses.

Before an Asian tamed a horse some 10,000 years ago men had used horses only as food. The first book of the Bible tells of horses being used for pulling chariots and for riding. The ancient Greeks and Romans harnessed horses to chariots and raced them in thrilling contests.

How Different Kinds of Horses Are Developed

Farmers and loggers need big, strong horses to pull heavy loads. Racing men want light, tall horses that will run fast. Cowboys and polo players must have small horses that can start, run, dodge, twist, turn, and stop quickly. Pleasure riders want fine looking, lively horses that are comfortable to ride. (See also Cattle; Circus; Polo.)

No one horse could do and be all these things. Men get the kinds of horses they need by selective breeding. In selective breeding male and female horses with especially desired qualities are mated. For this reason

horses are said to have "the blood" of their fathers and mothers or even to have "the blood" of a famous ancestor of many generations back (see Heredity).

Horses that have a specific group of qualities and that almost invariably transmit these qualities to their young are purebreds of a single breed. For the better-known breeds, see the table that appears later in this article.

Special Words Used in Talking of Horses

A male horse is a stallion. If he is spoken of as a father he is called a sire. A male horse that has been desexualized is called a gelding. A female horse is a mare. If she is spoken of as a mother she is called a dam. During their first year young horses of both sexes are called foals, and during their second year, yearlings. Horses are said to be the get of their parents A young male horse is called a colt and a young female horse, a filly. The parts of a horse's body are named in the picture on the next page.

A foal is born with its eyes open about 11 months after its conception. Within a few minutes of birth it can stand and walk. A foal takes milk from its dam usually for four or five months. A foal's first teeth, called "nippers," soon appear at the front of its jaws, and at the end of ten months it has grown a full set. Permanent teeth begin to grow in a horse's third year, and it has all its teeth by the end of its sixth year. Teeth reach full growth during the horse's tenth year. A gap between the front and rear teeth is called

s bar and in bridling the horseman places the but in this gap

Enamel ridges stand out from the softer dentine and cement of a horse's teeth These ridges completely wear sway by the horse's eleventh year A horseman can accurately tell a horse's age up to its eighth year by the condition of these ridges (see Teeth)

The height of a horse is the distance between the ground and its withers. A horse is measured in hands -one band equals four mehes. Thus a horse that measures 14-2 (or 14%) hands has withers 58 mehes

sbove the ground

The First Purebred Horse Ancient Greek and Roman sculptures show small compact horses that have small beads with prominent foreheads From forehead to muzzle the outline of the head is slightly concave or "dished" The modern Arabian Horse also looks like this, and so it is probable that the Arabian Horse has been a purebred for more than 2,000 years (For picture, see Greek and Roman Art )

Although the Arabian Horse accompanies its master on camel caravans, it is ridden only in emergencies When danger threatens or a raid on a weak, rival esteven promises, it bears its rider swiftly and tirelessly The Arabian's master watches over it realously, and at night a epecially treasured dam and her foal are

sheltered in their master's own tent Arshian Horse blood runs in the yeins of almost all hight breeds The Barb (for Barbary Coast) of North Africa although larger, carries much Arabisn

blood Both the Arabian and the Barb are also called 'Onental" horses

Heavy Breeds of Horses The horses that do the heavest work are called

droft horses Their ancestors were native to the Flemish lowlynds, now the Netherlande Belgium and s northern section of France These were the Great Horses of Europe The Great Horses were midden by Conqueror's invasion of England in 1066 was aided by Great Horses Crusaders rode them as they battled for the Holy Land (See also Armor, Huns, Hundred Years' War, Smith )

HORSE

With the invention of gunpowder, speed became more essential than armor and the hig horses were turned over to farmers and wagoners who before this had used oven Through selective breeding the Great

Horses were developed to even larger size

In France's La Perche district the Great Horse hecame the Percheron which at the start of its development was also called the Norman It is believed that some Arabian blood was bred into the Percherons The United States imported its first Perchetons in the 1840's and it now has more horses of Percheron blood

than of any other draft breed (see Agriculture) Another great draft breed developed in Belgium, is called the Belgian Horse England and Scotland developed three great draft breeds the Suffolk Punch the Share and the Clydesdale America has few Suffolk Punches, but it has many of the other two breeds

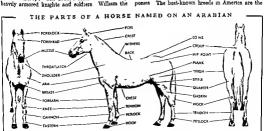
The Shire, biggest of all horses was developed in central England From knees and books down it grows long hear called "feather" The Clydesdale developed in Scotland, has a high and lively step Festher grows at the aides and backs of ite lower legs

Coach and Heavy Harness Horses

Before the days of the railroad, middle-sized horses pulled stagecoaches Such horses needed to trot hour after hour France and England respectively developed the Percheron and the Cleveland Bay, other countries developed like breeds

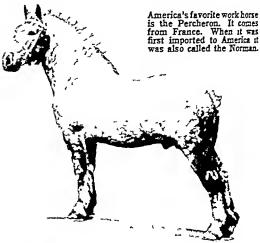
London's public street coaches were named for the Hackney Horse-that is one let out for hire These horses developed a much admired action-high lifting head and feet They became the Hackney breed, which now as one of the most attractive brands of show horses

The Smallest Horses Horses that measure less than 14-2 hands are called pomes The best-known breeds in America are the



# FOUR GREAT DRAFT HORSES









Shetland and Welsh ponies. Some Shetlands reach 11-2 hands and weigh up to 500 pounds. They grow long, shaggy hair in the winter. The Shetland's short legs and rounded body make it appear a midget draft horse, and in its native land it is so used.

The Shetland comes from the Shetland Islands, an island county far north of Scotland (see Shetland Islands). The islands—rugged, with long, cold winters—grow little grass. The hardships, scarcity of food, and inbreeding account for the Shetland's small size. Because the Shetland is gentle and playful, it has become a riding and harness pony for small children.

The Welsh Pony is descended from the early small English horse and, judging from its sleek appearance, from the Arabian. It weighs from 600 to 850 pounds and ranges from 12 to 14-2 hands high. The Welsh Pony is gentle and has considerable dash and style. It is popular as a saddle and harness pony for older children. In Welsh mines it pulls heavily loaded, underground coal cars.

Other small horses are the Iceland Horse, which has a large head and shaggy hair (see Iceland), and the Chincoteague Pony, which runs wild on islands near the Virginia coast. Legend says that the Chincoteague ponies are descendants of horses that swam ashore from a wrecked Spanish galleon. They have become small because of inbreeding and lack of food. Once a year the Chincoteague ponies are rounded up; the best are sold and the others turned loose again.

The Light Horses

Horse races began sometime in prehistory when two men first argued as to which owned the faster horse. In England races were run so that traders could show the quality of the horses they wanted to sell. During the 1300's regular race meets were held. Because English kings followed racing enthusiastically, it is often called the "sport of kings." James I, who ruled from 1603 to 1625, was the first English king to encourage the breeding and racing of light horses. He established a great racing center at Newmarket.

# TWO PONIES AND SIX FINE LIGHT HORSES



These two children are riding a Sheiland Pony It is gentle and playful the perfect small horse for little children. It comes from the cold Sheiland Islands.





The Morgan Horse can be sidden drawn, or worked Admington and a few many control of the control











English racing led to the development of the purebred known as the Thoroughhred. All American and English Thoroughbreds of today have the blood of one or more of three Oriental sires brought to England: the Byerly Turk, imported in 1689; the Darley Arahian, imported in 1706; and the Godolphin Barb (or Arahian), imported in 1724.

The American Thoroughbred

English, Dutch, and French colonists in America raced horses hefore the end of the 1600's. The desire to own horses that could win led to the importation of the fast English horses hefore they were generally

known as "thoroughbreds."

American hreeding and racing first centered in Virginia. As Tennessee and Kentucky were settled, fast horses were hred there too. Today the American Thoroughhred is raised from New England to California, hut the "hlue grass" region of Kentucky is the most famous race-horse breeding region of all (see Kentucky).

The Spanish Horse

America had no horses when it was discovered by Columbus in 1492. The Western wild horses—known by such names as hroncho, cayuse, mustang, pinto, Indian pony, and hroomtail—are descendants of horses strayed or stolen from such Spanish explorers as Cortez and De Soto. The Spanish horses were quite good because they had the blood of Arahian and Barhancestors.

Although white men and Indians have rounded up thousands of wild horses, there are still a few bands roaming the West. Today the hest of those captured are broken and sold, and the poor ones are slaughtered for meat, some of which becomes human food and the

remainder, food for cats and dogs.

The best of these wild horses are small, quick and fast, and have great endurance. The get, or offspring, of Spanish and hreed matings are even better, and many fine Western horses of today are the result of such matings.

Other American Breeds

The light breeds developed exclusively in America are the Quarter Horse, the Morgan Horse, the Standardhred Horse, the American Saddle Horse, and the Tennessee Walking Horse. In addition, Americans have developed several horse types distinguished for colors. Horse hreeders of each breed and type have formed associations. Only horses that meet rigid standards of ancestry, conformation (shape and structure), performance, or color can he registered with these associations.

The Quarter Horse was developed from the earliest horses brought to America, and so it has Spanish and English horse bloods and, through these, Arabian blood. Imported Janus, an Arabian brought to America in 1752, was probably the most influential

single sire of the breed.

The Quarter Horse served the colonists as both a light work and carriage horse, but its greatest value lay in its speed at short distances over wilderness trails. The colonists held races on short, straight courses cleared from the forest. These races, about

a quarter of a mile long, gave the breed its name. The Quarter Horse was the perfect horse for the frontiersmen's needs, and as they pushed the frontier westward they took their Quarter Horses along.

Today the Quarter Horse is a fine ranch horse. It has been improved by the addition of Thoroughbred hlood. Quarter Horse stallions, particularly in the Southwest, are mated with the finer mares of unknown breeding to improve the common ranch, or stock, horse quality. Quarter-mile races are still popular.

# SOME OTHER LIGHT HORSES

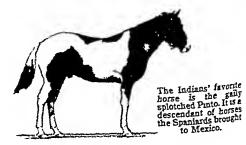


The beautiful golden Palomino is a color type rather than a breed. It makes a good rench horse and a showy parade horse.



The white Lipizzan is called the series of this horse because of the series of the s





## BREEDS AND COLOR-TYPE HORSES

Breed	Place of Origin	Breeds from Which Developed	founds fon 5 res	Principal Use		Usual Weight Range (Pounds)	Common	
WORK COACH AND CARRIAGE HORSES								
Percheron	France	Great Horse dash of Arabum		Draft	16 to 17	1 600 to 2 100	Gray black	
Belgian Clydesdale	Belgium Scotland	Great Horse Great Horse	j	Draft Draft	16 to 17 16 to 16-3	1 700 to 2 100 1 600 to 2 000	Chestnut bay roan Bay brown black	
Sh re	England	native stock Great Horse native stock		Draft	16-2 to 17 2		Bay brown black chestnut gray ross	
Suffolk Punch	England	Great Horse		Draft	15-2 to 15 2	1 600 to 2 000	Chestnut gray roas	
leveland Bsy	England	Thoroughbred		Coach	16 to 16-3	1 250 to 1 550	Bay with black point	
Hackney	England	Thoroughbred native stock	Blaze	Carrage	14-2 to 15 2	900 to 1 100	Bay brown chestnut	
		Light	HARNESS	AND R	DING HORS	ES		
Arabian	Asia Minor	Arabian		Riding	15 to 15 1	750 to 1 000	Chestnut bay brown	
Barb	North Africa	Arabian native stock		Riding	14 2 10 16	850 to 1 150	Bay gray chestnut brown	
Thorough bred	England	Arabian Barb native stock	Byerly Turk	Riding	15 to 17	850 to 1 350	Chestnut bay black brown gray	
			Darley Arabian Godolph n Barb					
Quarter Horse	America	Spanish Thorough	Imported Januar	Riding	14 to 15	800 to 1 200	Chestnut bay brown	
Morgan	America	Unknown—assumed	Justin Morgan	General purpose	14 to 15	800 to 1 000	Bay brown chestnut black	
Standard bred	America	Thoroughbred Arabian, Thorough bred Morgan Various pacing and trotting atocks	Messen ger Ryks dyk s Hamble	Harness facing	15 to 16-1	850 to 1 200	Bay brown chestnut roan gray black	
American Saddle	America	Thoroughbred Morgan pacing	tonian Denmark	Riding	14-2 to 16-1	900 to 1 200	Bay brown black gray chestnut	
Tennessee Walk ng	America	Standardbred Thoroughbred Morgan Ameri	Allan F i	Riding	15 ta 26	950 to 1 200	Bay black chestnus roan gray	
			COLOR '	Type He	ORSES			
Palomino	Mexico United States	Arabian Spanish Thoroughbred		Rdng	15 to 16	1 000 to 1 200	Gold (several shades)	
Prato	Mexico Un ted	Spanish		Rdmg	14 to 15-2	800 to 1 000	Black and white spotted or white and another color	
Appaloosa	States Un ted States	Spanish		Rdmg	14-2 to 15-2	800 to 1 050	Roan chestnut white small round or oval white or color spots	
Albino	United States	Uncerta n some Arabian, Morgan	Old King	Riding	12 2 to 16	900 to 1 300	Solid white	
			1	Ponle				
Shetland	Shetland Islands	Unknown		Righing or Harness	to 11 2	to 500	Brown black chest- nut some spotted	
Weish	Wales	Arabian Thorough bred native stock		Harness	10 to 12 2	400 to 650	Chest ut hay gray black, roan white	
Hackney	Fngland				12 to 14 2	600 to 850	Bay brown chestnut	

# THESE HORSES DEMONSTRATE THE



The WALK. Society Sensation performs the Running Walk. It is an evenly-spaced four-beat gait in which the hoofs strike





the ground in this order: (1) Left front; (2) right rear; (3) right front; (4) left rear. The Running Walk, the special gui d



The RACK. The American Saddle Horse Golden Butterfly, a five-gaited champion, demonstrates the Rack, which sometimes





is called the Singlefoot. The Rack is fast and flashy. It is an evenly-spaced four-beat gait in which the hoofs strike the



The TROT. The Trot is one of the two racing gaits of the Standardbred. It is also a riding gait. In going from walk to



canter, a horse uses it as a transition gait. The Trot is a two-beat gait with the hoofs striking the ground in this order:



The PACE. The pace is the second gast at which harness horses race. It is a two-beat gait in which the front and

rear hoofs of the same side take off and strike the ground together. The hoofs rise only a very little above the ground. For



The CANTER. The run is the fastest canter. Citation demonstrates the four-beat gait as he wins the 1948 American

The Morgan Horse is equally good under saddle or in harness as a work and carriage horse. The breed sprang into being all at once in its sire, Justin Morgan (named for one of its owners), foaled about 1790. Justin Morgan was famed as a work, carriage, and saddle horse, and all his get and the get of most of his descendants inherited his qualities. A story is told that, on a bet, Justin Morgan, only 14 hands high, was set to pull a large log embedded in the ground that a big team had failed to budge. At command Justin [428/]

Derby. His hoofs strike the ground in this order: (1) right rear (2) left rear; (3) right front; (4) left front. As he gathers

Morgan tightened the chain. The log did not move, and the strong little horse flattened on its haunches and strained forward until the log first quivered, then broke loose. It is told that Justin Morgan pulled the log to where it was wanted at a trot.

The Morgan Horse has also been used as a harness racer. Its blood has been bred into the Standardbred and the American Saddle Horse. Morgan stallions are also mated to mares of unknown breeding to "upgrade" the get (to improve the quality of descendants).

#### FIVE MOST IMPORTANT GAITS



ennessee Walking Horse, is slightly faster than the ordi-Walk. In performing it the year foot of the Walking



ground in this order (1) right front, (4) right rear The Re difficult and tiring on the horse. Not many form it for more than a few minutes without



(1) Left rear and right front, (2) right test and left front Be-tween each best for an instant all four boots are off the ground.



et the moment when the hoofs of one side oofs of the other reach forward, the pacer floats



under him for the next 1-2-3-4 contacts he fic A Thoroughbred must be sound to withstan

The tall fast angular Standardbred was first developed as a fast carriage horse, and then as a harness racer at the trot and pace Except for its angularity it looks much like the Thoroughbred Its ancestry includes Arabian Thoroughbred, and Morgan bloods The foundation sire of the breed is Ryksdyk's Ham bletonian foaled in 1849 Standardbred blood has been used to upgrade Western stock horses polo horses and pleasure horses Standardbred-draft crosses produce excellent middle-eized work horses The Standardbred pulls a light two-wheeled cart called a sulky Its fastest mile at the trot is I minute and 5514 seconds, at the pace, 1 minute and 55 seconds The American Saddle Horse is the showiest of the hight breeds Its head, on a finely arched neck, is carried proudly and its feet are lifted high and placed firmly and precisely Riders find its several gaits comfortable It was developed by farmers and plantation owners of Virginia Tennessee, Kentucky, and Missours as a fine riding and carriage horse

Its ancestry includes both Thoroughbreds and Morgans. A pacing ancestry contributed to its comfortable saddle gaits. The foundation sire was Denmark, a Thoroughbred foaled in the 1830's. The American Saddle Horse has been used to upgrade pleasure and Western stock horses. Its blood contributes to the splendid riding qualities of the Tennessee Walking Horse

The Tennessee Walking Horse can walk so fast that its gait is called the "running walk." This great saddle horse, bred by plantation owners of middle Tennessee, can carry its master all day long at a walk that covers from six to seven and a half miles an hour. At the running walk, the Tennessee Walking Horse's head bobs in time to its movements. The breed was developed from Thoroughbred, Morgan, Standardbred, and American Saddle Horse bloods. Its foundation sire was Allan F-1.

The Color Type Horses

The horses bred for color are Palominos, Pintos, Albinos, Appaloosas, Buckskins, and American Creams. All except the American Cream, a draft horse, are saddle mounts, used by cowboys, pleasure riders, and parade riders.

Of these the golden-hued Palomino and the largespotted Pinto are the best known. Besides Spanish blood the Palomino may have one or several more bloodlines, including American Saddle, Arabian, or Tennessee Walking Horse. The Pinto is a descendant

SOME RELATIVES OF THE HORSE

For many centuries the ass has helped men by carrying burdens. It also is called the donkey or the burro.

of the Spanish Horse. Appaloosas are queerly spotted Spanish Horses developed in the 1800's by the Nez Percé Indians of the Northwest.

#### Horse Shows

Horse shows encourage owners and breeders to improve the conformation, quality, and performance of their horses, and thus the breeds themselves These shows are held at state and county fairs and at other livestock exhibitions.

Large shows have classes for all breeds, including draft, harness, and riding horses. The most colorful classes are the three-gaited and five-gaited saddle horses, the harness horse, and the Hunter and Jumper Many Western shows have classes for cattle-working and parade-type horses. The Hunter is judged on its conformation, soundness, and its way of going and of making its jumps; the Jumper is judged only on its ability to clear the jumps. Pictures of a Hunter are shown in the article on Motion Pictures.

Three-gaited horses show the common gaits the walk, the trot, and the canter (a slow gallop or run) The five-gaited horses, in addition to these, show the stepping pace (also called the slow gait or slow rack) and the rack (also called the singlefoot). (For pictures of these, see the pages on Gaits.)

Specially trained horses, such as are exhibited on the stage and in circuses, are called "high-school" horses. The most skilled of the specially trained horses are the Austrian Lipizzans, all-white horses that have been trained for seven or more years

The Ass and the Mule

The ass, or donkey or burro, is a cousin of the horse; its scientific name is *Equus asinus* (see Ass) Asses may be as small as a Shetland or as large as a small work horse. In Mexico and in the Western United States the smaller asses, called burros, are used as pack animals.

The mule, the get of a male ass and a female horse, is a hybrid. Only rarely can a female mule have young; a male mule has never sired young. The result of crossing a male horse and a female ass is the hinny, which is not a good work animal. A mule can work hard even in hot weather. In the United States



The Mule (left) is the get of a male ass, or jackass, and a female horse, or mare. It can work hard in quite warm climates Sm asses (right), called burros in Mexico and in the western part of the United States, carry a prospector's supplies

is men have learned how the horse developed over a

Eventually they disap



serve as general draft animals. Sold ers use them as pack animals in mountainous regions. A horse bot from exercise that overests or overdrinks suffers an ailment called founder The mule refuses to over est or overdrink at any time

Deciming Use of Horses and Mulce Mechanical substitutes for power and transport such as the railroad truck and tractor have cut down the number of horses and mules (see Transportation) In 1900 American farms had 18 267 000 horses and 3 265 000 mules The numbers increased until 1920

but then began to decline In 1950 American famus had only 5 274 000 horses and 2 149 000 mules The ten states which in 1950 had the largest num

#### bers of farm horses and mules were

Hons	29	Mules			
Cottas	852 000	M se se pp	276 000		
fireour.	347 000	North Carol ne	243 000		
Innesota	264 000	Georgia	224 999		
URA	242 000	Tennessee	205 960		
febranka	236 000	Alabeme	190 000		
меопии	224 000	South Care na	151 999		
kishorns	213 000	Texas	139 666		
Canana			125 000		

135 000

117 900

Lou s ene How the Horse Developed

A horselike creature called an Echippus ate the leaves of close-growing plants in America some 55 milion years ago It was about the size of a fox terrier and had four toes on its front feet and three toes on its rear feet (see Prehistoric Life)



also a relative of the horse. It develop thra has never been tamed for domest s also a relative of the horse



three toes on each foot of these the center toes had grown longer and attonger because the Mesoh pour ran only on them The Merychappus was the name of a still later development. It was the size of a small pony and had hoofs really thick toensils on its middle toes Its other toes were so small that they no longer touched the ground

The next stage was the Phohippus The small toes had so decreased that they were only thus bone splints attached under the skin to the bones of the center toes The Equas the true horse developed from the Phohippus during the Ice Age (see Evolution Foot)

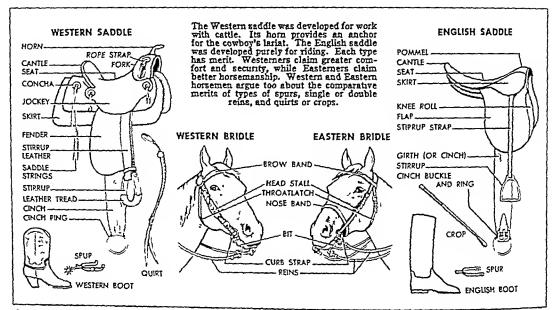
It is generally believed that about 5 million years age horses migrated by way of a land bridge now covered by the storm tossed waters of Bering Strut that connected Alaska and Asia. For some reason horses ded out in America. In Asia they multiplied and apread to Europe and Africa Horses did not reappear in America until they were brought by Span mark. The scientific name for the present-day horse

18 Equits coballius In Assa and Africa the species called ass developed from the Equue In Africa only did the zebra species develop (see Zebra) Asses were used as burden car mera by men long before the horse was generally used

How to Train a Horse Horse lovers claum that a horse is just as much an individual as a human being So they say one must get to know a horse s traits before beginning its train mg All horsemen agree that the trainer should move slowly and handle the foal gently but various ways of training are favored The way the famous King

Ranch of Texas trains horses is told here A foal is handled before it is three months old so that it becomes accustomed to men. By the time it is three months old it is introduced to a hackamore or halter to which a lead rein has been attached. The trainer teaches at to follow a lead by pulling gently on the lead rem and to obey signals by drawing its head first to one side and then to the other. The trainer rewards the foal with a carrot or an apple when it obeys Sugar as a reward is frowned on by many trainers. In six to eight half hour lessons a foal will learn to follow a lead rein

The feal is then taught to stand as its foot is lifted (as though it were to be worked on) If the foal struggles the foot is set down and the frightened animal petted the foot is lifted again within a few munites however The foal a tra ning stops during its



first winter, but now and then its trainer feeds it hay and grain from his hand to remind it that he is its friend.

Training the Yearling

When training begins the next spring, the foal, now called a yearling, is reminded of its first lesson by being led. It is then bridled. After it is accustomed to the bridle, a blanket is slipped on and off its back. Only after it is familiar with this is a saddle put on and the cinch strap fastened loosely under its belly.

The yearling is led until it is at ease with the burden. Then the cinch is tightened. The trainer carries on with the leading lesson for another quarter of an hour. Next, after the bridle reins are tied so that they will not swing, the trainer permits the yearling to trot and canter as it wishes. This freedom accustoms it to the feel of bridle and saddle, the bump of stirrups, and the sounds of creaking leather.

The yearling's first rider should weigh not more than 90 pounds. Under the rider it is again led for a short time. Then the rider guides it. It is encouraged to trot only after it has learned to respond to signals at the walk. At this stage the yearling is slowed, turned, trotted, and halted several times. While halted, the rider dismounts and mounts four or five times. The lessons should be for half-hour periods only. After it becomes thoroughly familiar with and obeys commands, the yearling is turned free in pasture until it reaches two and a half years.

When training resumes, the young horse is again accustomed to hackamore, bridle, blanket, and saddle. It is then mounted by an average-weight man and, at a walk, is turned about and guided through several figure 8's. In the first half-hour lesson, the rider mounts and dismounts several times. During the succeeding lessons, the horse is trotted and cantered.

After several such lessons the young horse is sufficiently trained so that it can be ridden by a rider of ordinary ability.

How to Care for and Feed a Horse

The proper care of a horse requires regular times for feeding and watering. It also demands more work, time, and patience than other pets. A horse's fitness depends upon proper food, care, and exercise. Its stall should be clean and well-bedded with straw, wood sawdust, or shavings. Its hay foods should be mixtures of timothy and alfalfa. Some clover may be mixed with these. Heavy oats are the best grain food, and ear corn also can be fed. To avoid respiratory troubles hay and grain must be free from dust.

A horse is fed about one pound of grain and one and one tenth pounds of hay per day for each hundred pounds of its weight. It needs some salt and a great deal of water, but it should neither be fed nor watered while heated by exercise. A good rider cools his horse out by walking it the last mile to the stable. An hour or so a day of grazing on good pasture is beneficial.

Grooming and Shoeing

Mud can be loosened from a horse's coat with a rubber currycomb and a fiber brush. Necessary grooming includes a daily vigorous brushing with a bristle brush. This cleans hair and skin and stimulates the skin glands.

A horse needs either to have its shoes reset or new shoes every four or five weeks. In winter its shoes should have steel calks that will bite into snow or ice. A good rider will not push his horse faster than a walk or jog on frozen ground, but on moderately packed snow it can be ridden at a fast trot or even at an easy canter.

Before and after a ride a horse's feet should be examined and cleaned. Stones, pieces of metal or wood, and other foreign objects may be picked up by the bools. These can be pulled out with a foot book or any dull pointed metal piere

How to Ride a Horse

There are two well known styles of riding-the Eastern and the Western The Lastern style saddle is small and the stirrup leathers usually are medium in length. The Western style saddle is large usually with long stirrup leathers and has a horn atop the commel Both styles of riding can be learned only by practice The first lessons should be under supervi sion. A quiet horse should be chosen one that will halt of itself if the rider loses his talance Bilance is maintained by the rider gripping the middle leather firmly with his thighs knees and calles. The walk

re quite fast enough for the beginner After a few lessons the beginner may ride at the trot

Posting is learned at the trot. This is the controlled rise and fall of the rider a body in time with the horse's movements Its purpose is comfort to the rider and to ease the burden on the horse. In the Western saddle, the rider flexes his knees and ankles

m time with the horse's movements Bug estres maintain riding paths through their parks

for followers of the sport Riding facilities are avail able in both city and country and it is almost cer tam that one can find them in his own locality A number of fine books on horses and riding appear in the bibliography with the article on Hobbies

## How HOSPITALS Give EXPERT CARE to the Sich

HOSPITALS The modern hospital is first of all a place for skilled scientific treatment of the sick It is coming more and more to be a medical center, where doctors send patients for exemination and dugnous as well as for treatment. I mally the larger modern hospitals are training centers for young doctors and nurses. Some of them are also research centers where new drugs, surgical procedures, and treat-

ments are developed The United States has nearly 9 000 hospitals They range in size from modest establishments with a dozen beds and a single doctor to huge medical centers with 1 000 or more bade and hundreds of doctors nurses and trained employees About half the nation s hospital beds are in columnary hospitals. These institutions are governed by groups of men and nomen who serve voluntarily without pay Many voluntary hos-P tals are owned by or affiliated with churches Others are operated by citizens to provide hospital care for their communities The voluntary hospital does not make a profit for its owners. The money it receives from patients who pay is all used in providing service Some hospitals are operated as profit-making busineses, usually by groups of doctors who wash to provide luxury service for their patients

About half of the hospital fresht es in the United States are provided by various branches of the government The Veterans' Administration of the Federal government operates a vast system for former members of the armed forces while the Army, Navy, and Air Force have hospitals for those on active duty The state governments also maintain hospitals most of them for patients with tuberculosis and mental diseases Such ailments require long periods of hospitalization and lew families can afford the cost. The state therefore provides the needed care. Many county and city governments also maintain hospitals to provide care for the sick especially for those unable to pay

Organization of a Hospital

Supreme authority in mo thongovernment hospitals is evercised by a board of trustees often called a goveming board Under this board is a medical staff in tharge of all the treatments and other professional work General management is usually entrusted to a single executive called the administrator director or superintendent

The medical staff consists of the doctors who are entitled to use the hospital and its facilities for treating patients. Doctors are granted this privilege by the governing board upon recommendation by the staff members In some hospitals the staff consists only of doctors who share in the management and treat

the patients which the hospital assigns to them. Those who use the hospital only for treating their own patients are called coursesy members

Many Services Rendered by Nurses All hospitals have the same basic departments and services The most fundamental service is nuising eare Trained nurses represent the doctors 24 hours a day at each patient a bedinde Each nurse keeps a chart of temperature and pulse rate for each patient m her care She also notes every sumificant detail about the patient's condition and reactions When a doctor ' makes rounds '-calls on his hospital patients, usually in the morning-a glaure at each put ent's chart gives him an up to-the-minute basis for decidmg what may need to be done

The purse must also keep each patient clean Durmg "morning care" she changes the bed linen and hathes her patient in hed If a patient is extremely ill

or helpless she may have to feed him

Finally, the nurse carries out the doctor's instructions for medical care. She changes drewings or bandares on a surrical incision or wound or assists the doctor in doing so She gives medicines by mouth or by mucture them with a hypodermic needle. The nerse may have to set up an ovygen tent or the bottles and tubes which drip nourishment or drugs directly into the veras

In many hospitals, some simpler duties such as cleaning up the room making the bed carring the bedpap, and feeding the patient, are performed by assistant nurses who have been trained only for this Book Such an assistant may be called a practical

hurse, hurse a aide ward helper or ward attendant Each hospital floor, or corridor where patients' rooms are located, has a central nursing office called the nurse's station Usually it is near the elevator and service rooms and at an angle to the corridor. From this station, the head nurse controls the care of all the patients in her charge. A single station may supervise from 15 patients to as many as 40 or more.

Rooms, Wards, and Food Service

The growing complexity of hospital care and the growing desire of patients for privacy are leading hospitals to change from wards for 10, 12, or more patients to more private and semiprivate rooms for one, two, three, or four patients. Only in a few of the largest government hospitals is the huge, open ward for 50 or 60 patients retained.

An exacting task is that of serving three meals a day to people in bcd who are ill and often critical of their food. Also, from 10 to 30 per cent of the patients may require special diets to suit their conditions. Kitchens and food-service departments are directed by the head dictitian. In a large hospital, this person has had many years of special training and may have a staff of assistant dictitians. The actual work requires cooks, butchers, bakers, tray girls, maids, and dishwashers.

In many older hospitals, food is prepared in a central kitchen. When ready it is placed in bulky containers, then carried in heated carts to serving kitchens on the hospital floors. There it is served, into dishes, placed on trays, and carried by maids to the patients. Most newer hospitals, however, use central tray service. Under this plan, the individual trays are made up in the central kitchen. Dishes are covered so hot food will remain hot and cold food will remain cold while the trays are being delivered.

Operating Rooms and Other Professional Services
Nearly half of the patients in the average hospital need some kind of surgical treatment. The
operating-room suite or floor is the place where this

is done. In older hospitals, the operating rooms are located on the top floor, where they can more easily be kept free of dirt and dust and where big windows give the greatest amount of light. Today special lights and forced-draft ventilation and air-conditioning equipment make it possible to locate the surgical suite on any floor.

Outside the operating room or every two operating rooms is a scrub room. Here doctors and nurses on the operating team scrub their hands and arms free of germs, then put on newly sterilized gowns, caps, and masks to avoid infecting patients with germs. All the instruments and materials used by the surgeon are sterilized in steam tanks. Operating-room floors are made of special conductive material which carries of static electricity. This is important, because many anesthetic gases are explosive.

The delivery rooms where babies are born are planned like operating rooms to avoid infection All materials are sterilized, and everyone coming into the delivery-room area must be scrubbed, gowned, and masked. The same rules apply in the nursery for newborn infants. Visiting is carefully regulated to prevent outsiders from bringing in infection. Even the new father may be allowed to see his

baby only through a glass window in the nursery.

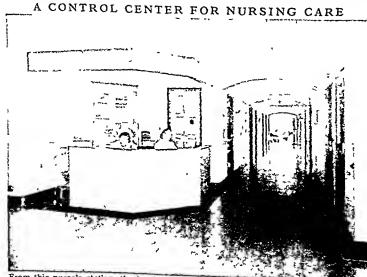
Some new hospitals prefer a "rooming in" plan
for newborn babies rather than the large nursery.
The babies are kept in cubicles adjoining their
mothers' rooms instead of in a large central nursery.

In many hospitals a casualty or emergency department has one or more nurses and interns who are always ready to receive victims of accident and sudden illness. They give first aid and prepare the patients for emergency operations or treatment. Many hospitals also maintain a clinic, or out-patient

department. Here patients are cared for who need treatment but not hospitalization. Some hospitals give service to the underprivileged without cost or for low fees.

Many patients in a modern hospital come for examination rather than for treatment. The hospital laboratories make needed tests and studies. The chief of the laboratory department is the hospital's pathologist. He is a doctor who specializes in identifying diseased conditions in tissues and body fluids. He rarely sees patients himself, but he is concerned with nearly every case, through the tests he makes.

Another important service is provided by the X-ray department, conducted by specialists called roentgenologists. They take photographs and also use the fluoroscope to view the



From this nurse's station, the head nurse for the area supervises the care of patient Charts and notes for each patient are kept here and a medicine cabinet holds the floor stock of drugs. Each patient can call for a nurse by pressing a button near his pillor Immediately a light flashes on over his door and a signal is given at the station.

body's organs as they function (see X-rays) The A ray department also has equipment for treating certain tumors and growths Similar treatments are given with radioactive materials prepared by the machines used for atomic fission (see Atoms) Use of beams from some of the machines is being developed

An important diagnostic aid is the basal metabolism machine. It measures the rate at which the body absorbs and uses foods. The electrocardiograph is used to make records of heart action

#### Hospitals as Medical Centers

Provision of such elaborate equipment draws medical care increasingly to hospitals. Few doctors in offices have the equipment to make the tests needed in modern medicine. But a hospital can provide the expensive equipment and the services of specialists because it can spread the cost over many patients

The presence of experienced doctors on the hospital staff makes many hospitals training senters In smaller hospitals, young sloctors found to even decreased many patients. Today ways have been tenters In smaller hospitals, young sloctors found to even decrease dangers while adding needed cheerful touches kurn by observing and working with those who have had more experience. Larger institutions have a formal teaching program Young graduates of medi cal school spend a year or more in the hospital as thierns or resident physicians. In these positions

they perform routine medical duties for staff members and work with older men in caring for patients Many hospitals also have schools of nursing open to girls who have graduated from high school They

learn by study in classes and by practical experience (see Nursing) Problem of Providing Hospital Service

As the hospitel has become more complex, it has asturally become more costly to build and maintain The modern hospital must have expensive drugs, equipment, and materials, and a large one needs many trained people Usually there is more than one employee for each patient As a result it costs about \$12 a day for every patient in the hospital

As hospital care became more costly, insurance plans were developed to help people pay their hospital bills. An individual pays small sums every month for hunself or his family into a common fund. The fund pays hospital bills for all subscribers. The largest membership-nearly 40 million in the United States and Canada-subscribes to Blue Cross plan

Management of a modern hospital requires a detailed knowledge of many different fields of work Every large hospital has an executive staff of highly trained men and women About 12 universities in the United States and Canada offer special graduate courses in hospital administration

#### Long History of Hospitals

Hospitals of some sort have been known smee early times In ancient Babylon people brought the sick to the market place and left them there, not only for shelter but so that passers-by could observe their ailments and suggest treatments. India

CHEERFULNESS IN A TWO-BED ROOM This two bed room is a recently built hospital above the modern trend toward attractiveness. Until recent years furture and other arms ments were heared became they might before germs and dust But this gave a black accessance which degreesed many pituatis Today ways have been

had shelters for the sick thousands of years ego

Egypt had temples of healing where the sick were treated by prayers, charms herbs, and drugs The ancient Greeks elso had temple hospitels,

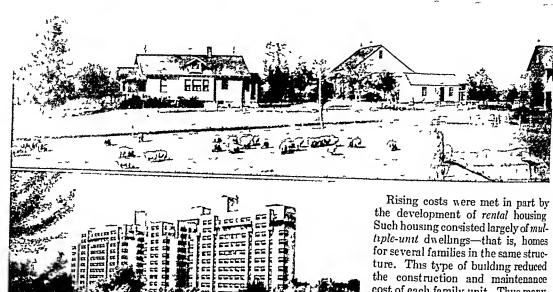
named after Aesculapius the Greek god of medicine One of the most famous was at Cos, an island in the Aegean Sea Here Hippocrates, the Greek physician who is known as the 'father of medicine," practised his art 400 years helore the birth of Christ

One of the greatest hospitals of the early Christian Era was founded by St Band at Cappadocia in Asia Minor Another famous hospital of religious origin is the Hôtel Dreu of Paris France It was founded in AD 660 and while it has been moved several times. has been in continuous service ever since. During the Middle Ages, many orders of hospital workers were formed Among them were the Knights Hospitalers of St John which was founded during the Crusadeo the Alexan Brothers, and the Order of St Lazarus of Jerusalem.

The care given in these hospitals was poor by modera standards Two patients or more often shared the same bed and beds were crowded together in huge halls Efforts were made to keep the patients clean and their clothes laundered, but patients commonly caught infections from one another

The first bosostal in the United States was founded at Philadelphia in 1751 Benjamin Franklin belped organize it, with funds obtained from the city government and several wealthy citizens The first building se still in use today In America as well as in Europe however, hospitals remained mere shelters to care for those too poor to be treated at home until rapid growth of scientific knowledge about disease in the 19th century changed conditions (see Medicine and Surgery) Today hospitals have the finest service and the most up-to-date scientific equipment

# Providing HOUSING for America's MILLIONS



rery family, whether rich or poor, needs adequate housing. This is true on the rm, in small towns, or in large cities. Adequate housing need not be luxurious may be as modest as the neat Midwestern farm (upper picture) or it may be as costly as the modern Philadelphia apartment building (lower picture).

Housing. One of the great national problems facing the United States today is that of providing enough good homes for its people. Housing has become a grave problem only in recent years. In colonial times land was cheap or even free. Pioneer settlers could build homes almost anywhere they chose. They could get wood, stone, and earth by cutting or digging, and they knew how to do the building themselves.

During the 19th century these conditions gradually changed. As the nation became more thickly settled, less free land was available. In the cities, desirable land became expensive. Also, an ever larger portion of the population earned its living at full-time jobs in factories, offices, and stores. These workers had no time to build houses, nor did they know how. They had to buy or rent their housing.

The type of household equipment also changed. As the century passed, city houses came to have gas and later electricity for lighting and cooking. Plumbing for running water and sanitary facilities became common. All this made houses more comfortable and healthful, but also more expensive to build.

cost of each family unit Thus many families could rent apartments or flats for less than they would have to pay each year for buying and maintaining their own houses.

Rental property provided good housing for most city families One exception was families on the lowest income levels-particularly immigrants who crowded into the cities and earned barely enough to maintain life. The only rental property they could afford was dilapidated housing in old, run-down neighborhoods called slums. Low-income fam-

ilies in country districts were also forced to use dilapidated housing; but their plight was less noticeable, because the dwellings were not in crowded areas.

For a short time during and after the first World War, a shortage of housing developed. But a building boom in the 1920's produced more than 700,000 dwelling units a year, in cities and towns. On farms the production of new homes lagged because farm income remained low; but on the whole, building did not slacken until economic depression struck the nation, beginning late in 1929.

Thereafter construction slumped to an average of about 275,000 dwelling units a year. This was not enough to house the new families added to the population each year; and it provided no replacement for worn-out or destroyed units. Also, countless dwellings deteriorated rapidly through lack of repairs.

The second World War added immensely to the mounting shortage. The government channeled most housing materials into the war effort, and construction workers went into war industries or the armed services. After the war, returning veterans and a huge increase

in the number of new families brought the need for housing to a crisis Comparatively few veterans could find the type of home they wanted. In many cases two families lived in a dwelling unit suitable for one A survey by the Census Bureau showed that perhaps as many as 13 million doubled up families wanted scrarate homes

New construction coul ! not eateh up with demand and high building costs added to the problem. A commonly used test of 'ability to pay' says that a family can afford to pay 21/2 times its annual income for a home (the payment being spread, of course over many years) If the home is rented, a family should spend no more than 20 to 25 per cent of its income for housing. On the basis of these tests much of the new home construction had to be sold or rented at prices which millions of families could not afford. The problem was complicated further by lack of sgreement about the extent of need and about the kinds of housing necessary to remedy the acute shortage

What Is Adequate Housing?

ONE accepted starting point for esti mating the extent of the housing problem 19 to determine how many homes are adequate—that is, how many dwellings

offer the shelter, conveniences, and healthful conditions necessary for desirable family hyper

Minimum requirements for an adequate home vary widely in different parts of the nation A home in Florida or southern California requires much less heating equipment than does a home in regions where winters are severe Ample fresh air and sunlight are a problem in cities but not on farms. On the other hand most city dwellers can have running water by turning a faucet but many farm families must obtain their water from a well

These varying requirements make it difficult to dewise any countrywide test of adequacy Probably the most commonly used tests are those which have been developed by federal housing agencies and authorities They include say major requirements as follows

1 Houses or apartments should not cover more than 30 per cent of the land This is to insure space for

heht and sur and playgrounds for children 2 Each dwelling unit should contain a living room. kitchen, bathroom, end ample storage space A family of four should have at least two bedrooms, a family

of are at least three and so on 3 Laving rooms should contain et least 150 square feet, bedrooms 110 square feet end kitchens (including dining space) 90 square feet. Each of these rooms

should have an outside window 4 Every home should include feculities for toilet. bathing, cooking, refrigeration, hot and cold water. electrio lighting, garbage disposal,

The dwelling unit should be safely constructed, with e reason-

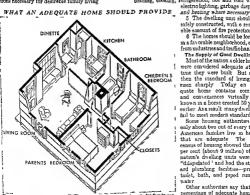
able amount of fire protection 8 The homes should be located

in a favorable neighborhood, eway from industries and traffichazards The Supply of Good Dwellings.

Most of the nation sokler homes were considered adequate at the time they were built. But since then the standard of living has tisen sharply Today en adequate home contains comforts and conveniences virtually unknown in a home erected 50 years earber Asa result many dwellings fail to meet modern standards

Some housing authorities say enly about two out of every three American families live in homes that are adequate The 1950 census of housing showed that 75 per cent (about 9 million) of the nation's dwelling units were not "dilapidated ' and had the standard plumbing facilities-private toilet, bath, and piped running nater

Other authorities say that the percentage of adequate homes is still higher, at least 88 per cent They cite the increasing



proportion of houses equipped with electric lighting, running water, and private cooking, bathing, and toilet equipment.

Under any test, however, an important part of the existing housing would not qualify as "adequate." Beyond this stood the plain fact that the total number of homes, both good and poor, was far short of the need. Moreover, adequacy tests and physical shortages do not take into account still other aspects of the housing problem.

Problems Created by Slums PROBABLY the most scrious housing problems arise from the existence of slums in cities, towns,

and even rural areas. During the 20th century, communities and the nation at large began realizing more and more clearly that slum living was not merely a problem for the slum dwellers themselves. It became accepted that a slum creates economic and social losses that affect every member of the community.

These widespread effects can best be understood by starting with the question, "What is a slum?" Congress has defined a slum as an area in which most of the buildings are detrimental to safety, health, or morals. This may be caused by dilapidation, overcrowding, faulty arrangement, or lack of ventilation, light, and sanitation facilities.

## The Nature of Slum Living

Many slums occupy what once were good residential neighborhoods. As the automobile and interurban transportation developed, the original residents moved to the city's outskirts or to the suburbs. Their homes were divided up into rooming houses and apartments for families of lower income. New houses and shops of cheap construction were built on most of the vacant land, shutting out sunlight and ventilation.

As many as ten or twelve people crowded into three- or four-room flats. Some of the rooms—usually bedrooms—had no windows. One hall toilet might serve 25 or 30 people, or the toilet was in the back yard. Lacking repairs, the buildings quickly became worn-out, dirty, and infested with vermin. Children had no place to play except in the

## WHERE SOME AMERICANS LIVE



Proper planning can produce comfortable, pleasant homes even in the heart of a big city. Parkchester in New York City has this large area where children can play safely.



Cities of every size have quiet, attractive residential neighborhoods. They are free from the hustle of busy streets and the grime and noise of industrial areas.



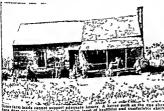
The countryside is dotted with many of these neat, roomy farmhonses. Such homes provide an abundance of fresh air, sunlight, and playground space for children



water hydreel to get cool on a bol sums



This street corner le typical of many o d ree deal at ac ghb ness have been started in an aree nircedy crowded with



streets and alleys In 1948 a joint Congressional housing committee reported that approximately a fifth of the urban population lived in such shim areas

Effects upon Community Health The lack of sunl ght and ventilation in c ty slums makes their in habitants an easy prey to disease Inadequate sanitary facilities over crowding fles and vermin help spread disease rapidly through en tire areas Old and d mly lighted stairways and halls also produce a high accident rate in the home

New York City compared the d sease death rates of families who lived in substandard homes with families of the same income group who inved in good housing In slum areas the death rate was almost twice as high for tuberc ilosis diph thena typhoid fever and spinal meningitis Figures from eight cities showed that in families averaging two or more persons to each room the infant death rate was 21/2 times bother than for fam bes who averaged less than one person to each room In one city fires in the worst tenements cause? four times more deaths than in better constructed though equally crowded buildings

Authorities in Newark NJ stud sed the effect of housing on a group of families that had moved from subatandard to adequate homes Over a two-year period the rehoused families had

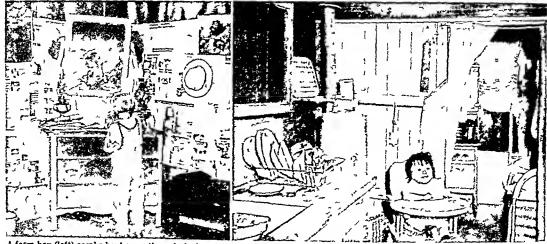
45% fewer cases of tuberculous 150 fewer mfant deaths 31% fewer cases of children a diseases 740 fewer fires

Poor housing in rural areas is also mrur ous to health Lack of sanitary toilet facilities is one of the greatest sources of disease on farms United States Public Health Service reported that typhoid fever was 73 per cent higher in dwellings that had no private inside flush toilet

Effects on Delinquency and Crime Juvenile delinquency cannot be asembed to any one influence. But it seems clear that quality of housing a definite factor

A Chicago study found that the number of truants from slum areas was more than twice the city average and the percentage of juvenile de inquents from slum areas was 234

### POOR HOUSING HANDICAPS MANY CHILDREN



A farm boy (left) combs his hair in the only hedroom in the house. Newspapers tacked on the wall help keep out the cold. The little girl's home (right) in a hig city is too crowded for comfort. Only curtains separate the kitchen from the bedroom

times higher On the other hand, in Newark, juvenile delinquency rates dropped 21 per cent among families who moved from slums to good housing elsewhere.

Crime records indicate the same results. Studies from several cities show that on the basis of population the crime rate in slum areas was two to three times greater for larcenies, robberies, and murders

The High Money Cost of Slums

Statistics cannot accurately measure the huge cost of slums in terms of ill health, broken homes, juvenile delinquency, and crime. But the money costs for fire, police, and public health services can be closely estimated. In Los Angeles, certain slum districts occupy 2 per cent of the city area and contain 15 per cent of the population. Yet these districts cost one-third of all the money spent each year for public health and for law enforcement.

In Buffalo, N Y, a study showed the average annual cost for each family in slum areas as compared with the city as a whole:

-	Slum Area	Citt Average
Police protection	\$ 27 16	\$ 19 19
Fire protection	35 79	15 40
Juvenile delinquency	60	25
Public health services .	52 56	15 52
Public welfare services	224 01	89 50
	8340 12	\$139 S6

At the same time low real estate and building values in slum areas cut drastically into tax revenues. Chicago found that it collected an average of \$4.25 a year from residents of slum areas; and \$11.30 a year from inhabitants of better neighborhoods. Thus the low revenue from slum property must be made up by every other taxpayer in the city.

GOOD HOUSING HELPS PRODUCE GOOD CITIZENS



This boy (left) has to stand on tiptoe to see his image in the mirror. But the hathroom in his home provides all the necessary sanitary facilities. In a large, bright kitchen (right) a young girl helps her mother put away the hreakfast dishes.

Shims are not confined to large cities. According to one study only 19 per cent of American slum areas were in cities of 500 000 population or more About 23 per cent were in cities of 100 000 to 500 000 and 58 per cent were in cities with less than 100 000 population

In 1948 a congressional committee reported that 'substantial improvements in farm housing conditions are needed ' A Census Bureau report had disclosed these conditions for farm homes

9 9% had more than 11 persons to each room 15 5% needed major repairs

36 7% had no electric lighting 64 6% had no running water

While such farm dwellings are not usually called slums "they may be just as harmful to safety health and morals as poor city housing Fortunately how ever, there has been some improvement in the condition of farm housing since 1948

Decay in

Housing is constantly being impaired by changes which threaten Neighborhoods to produce future slums These thanges arise from the fact that many American attes grew and expanded without careful planning

The general tend-

ency always has been to erect new emglefamily dwellings—that is houses—on vacant and farther and farthat from the heart of a city Thie costs much less than constructing new dwellings in built-up neighborhoods It elso provides en escape from city noise, dirt, end congestion. The outward shift wee made

posmble by steady improvements in transportation Meantime, if an older neighborhood had particular advan-

tages, most houses were kept in good repair, others were replaced with good or high quality multiple-unit dwellings In other areas housing and property values began to deteriorate Perhaps factories had entered the neighborhood or other changes had taken place that made the area less deurable Then the existing housing simply grew older year by year and was worth less either m a

sale or as rental property At the same time, declining property values failed to stimulate the construction of new housing in the neighborhood Once this stage was reached the area was and to be blighted When blight became noticeable the neighborhood usually deteriorated more and more rapidly Unless the causes of blight were removed and the area rehabilitated it eventually became a slum

Until after the first World War, communities paid httle attention to neighborhood blight. In the 1920's, however, the loss of tax revenue from such areas became serious, and the problem was made more pressing when all property values slumped in the economic depreysion of the 1930's The second World War blocked most public and private attempts to rehabilstate the older neighborhoods. But in the postwar years many communities as well as private builders constructed better planned housing in old as well as in new neighborhoods

Effects of Racial Restrictions

A factor in producing some city slums is the practise of restricting Negroes, Mexicans, Asiatics and other racial minorities to certain areas Formal agreements to this effect cannot be enforced by Liw, but property owners can simply refuse to sell or rent to members of these minority groups

As a result of segregation the racial districts coon become overcrowded For example in one large city, units built to house 1,127 families actually held 3 580 families and 646 roomers in addition. Under such pressures the area almost inevitably becomes a alum ESTIMATES

HOME BUILDING IN THE UNITED STATES

A FAMILY DWELLING UNITS BUILT 1925 由由由自由自由自由自由 1933 1946 金金金金金金金 1949 由自由自由自由自由自由自 UNITS NEEDED EACH YEAR for replacement for new families 1950

Each symbol represents 100,000 dwelling units

1960 1960 To house all families adequately builders should erect or make major repairs on 1.371.000 dwelling until avery year for ten years. Before the sector World Worths higgest year for new construction was 1923; the lowest limited, in 1946, 671.000 mails were built. The smill on mark was first reached to 1949.

housing needs of the United States vary because of differences of opinion as to how many houses need replacement or re pairing and how rap idly this should be done The Federal Housing and Home Finance Agency estrmated that from 1947 to 1960 the nation should build or rehabilitate 1,228 000 nonfarm dwelling units each year When this total was not

Future

Needs

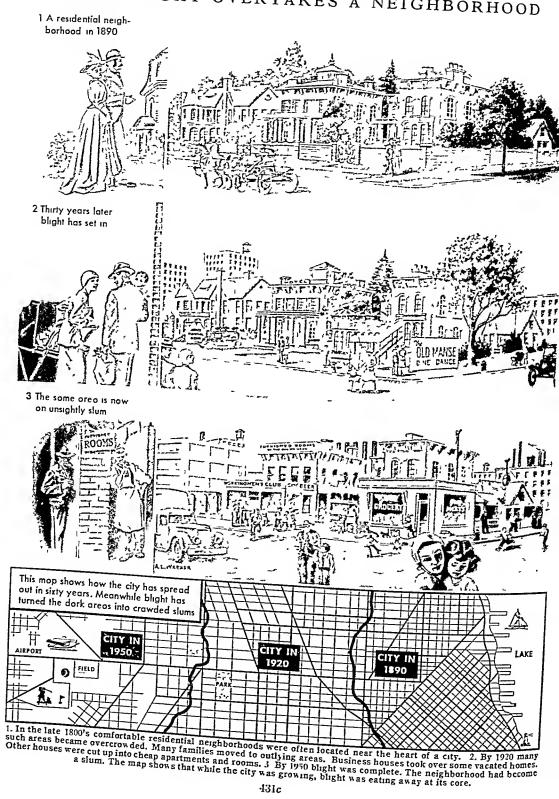
of future

reached in 1948 or 1949 the number of new or repaired units needed in each of the next ten years mercased to 1 372 000 (see chart on this page) The government also estimated that during this period an additional 2 to 3 million farm homes should

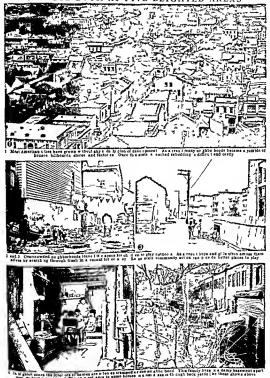
he built or rebuilt In 1950 a record number of 1 396 000 new dwelling units were built. Despite the demands of military rearmament in the years that followed, more than one million new units were started each year thereafter

A later section of the article explains what the nation communities and private enterprise are doing to help solve the problems of new construction, blight prevention, and slum clearance.

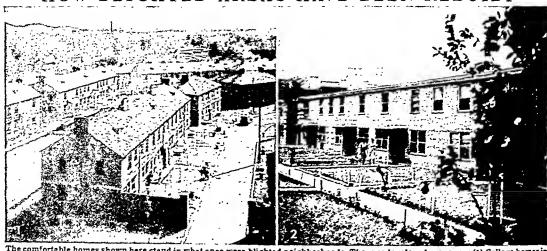
# HOW BLIGHT OVERTAKES A NEIGHBORHOOD



A CLOSE LOOK AT FIVE BLIGHTED AREAS



# HOW BLIGHTED AREAS HAVE BEEN REBUILT



The comfortable homes shown here staud in what once were blighted neighborhoods. These redeveloped areas are: (1) College homes in Knoxville, Tenn., (2) Brooks Homes in Chicago. Each was a public housing project financed by federal and local funds.

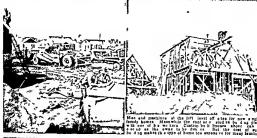


3. Day Village in Baltimore, Md., was built by private enterprise. The mortgage loan was insured by the Federal Housing Administration. 4. The Charles F. Weiler Homes in Toledo, Ohio, are a public housing project built for families with low incomes.



5. This is one of the units in the Benedict Courts, Columbia, S.C. 6. Here is a living room in the Holly Court project, San Francisco, Calif. Federal and local subsidies help pay part of the upkeep in both of these developments.

# Private and Public Action to Provide Housing



THE PROBLEM of providing, a le mate hou mg. 1 all Amencians in sgrantio in every aspect. After the record World War billing activity was seen if on a large scale. Beginning in 1949 more than of a milking are the view been started as a year in the United Stytes Mam, offer mints he ear rebuilt. Must housing experts however, post out that constructing new and rebuilt homes is only a partial ansies to to the housing problem.

Long experience has provolet that an important facter in producing neighborhood hight has been lack of sound planning to provide light air playgrounds and parks and freedom from undue no se grime and traffic dancers. In

some neighborhoods bight has advanced to a point where anny homes cannot be lixed up. Here the entire area must be cleared and then replained and rebut it nother area ve gor oss public and provide action can remove the cause of blight ad produce a pleasant rendential neighhorhoential neighborhoential neighborho

Classification of Housing Supply To determine the future housing supply tuthorites often classify neighborhoods according to how long tle b ki ngs may be evpected to provi a silequist como odstrom. The life eyestancy of a buildin, lege is upor ong nal soundness and how well at has been ustained. If they was is often used as save a 6 figure for the life expectancy of American louin. On this base neighborhood's containing to me fastest great containing to me fastest selection and maintenance may be cat side also flows.

1 \co-grouth areas \text{\tinx}\text{\tik}\text{\te}\text{\texi}\text{\text{\texit{\texit{\texi{\texi{\texi{\texi{\texi{\texi{\texi{\texi{\texi{\texi{\texi{

oil under normal conditions of development should return sale or rental value for many years

ERECTING A FACTORY MADE HOUSE

3 Areas needing conservation Most structures from 25 to 45 years old may need some improvement or reconstruction

4 Near-bighted areas
A majority of homes
substandard or more
than 45 years old ex
tensive replacement
and neighborhood re
habilitation usually
needed

s Blighted areas (slums) A majority of homes substandard 20 per cent or more need major repairs or are un fit for use The only remedy is demol shing the buildings and rebuilding



Prefeb icated houses ere built of stends d stred sections made facto y and essembled on the build ng ete. Here worke e fit u facto y and essembled on the build ng costs but families have

The Problem of Cost Behind the physical tasks of building new homes and reconstructing older neighborhoods is the problem

of cost. No one can estimate it accurately, but it certainly would amount to many billions of dollars a year. This problem was intensified by the increased construction costs in the years after the second World War.

Housing authorities often classify family incomes by "brackets." When the housing shortage reached a crisis during the late 1940's the Federal Reserve Board estimated the "money income" of American families was about as follows:

- A. 15 per cent received more than \$5,000 a year.
- B. 55 per cent received \$2,000 to \$5,000 a year.

C. 30 per cent received less than \$2,000 a year.

(In general, 'money income" includes wages, salarics, and income from a business or profession: pensions and welfare payments; annuities; and income from investments. It does not include savings or insurance benefits spent for current family living or produce raised and consumed by farm families.)

During this period there was a serious shortage of rental housing at every level of income. At the same time the median price of new and existing houses ranged from \$7,000 to

\$8,500 each. Most of the families in the lower-income groups could not pay \$7,000 to \$8,500 for a house. But if government agencies helped provide housing for many of these families, those who were not benefited would have to help pay the cost through some form of taxation.

smaller down payments.

The American people have traditionally accepted taxation as the means of providing certain public services. Among them are education, police and fire protection, sewage disposal, and provision of highways and roads. The use of government funds in the housing field would automatically add housing to these public services. This raises two basic questions: (1) to what extent should or could this service be undertaken, and (2) should the cost be paid by local, by state, or by federal tax levies?

## The Costs of Home Ownership

The cost problem becomes particularly plain in the field of home ownership. Few families have enough savings to cover the full purchase price of a home. Usually they make a down payment and borrow the remainder on a mortgage with their property as security Loans may be made by banks, building and loan associations, or investment brokers. The cost of the loan (financing charges and interest) must be added to the cost of the house and all other expenses through the years.

How all these expenses break down on a monthly basis is shown in the table on this page. The totals at the bottom are what families must be prepared to pay every month for 20 years in order to buy houses (new or old) at the prices shown.

Part of the home-buying problem was solved by the National Housing Act of 1934. The act created

the Federal Housing Administration, which insures approved loans. This made it possible for a home buver to obtain a single, long-term mortgage with a small down payment. The buyer could then repay the loan with moderate monthly payments that included taxes and insurance. One out of every three new homes is now financed with FHA-insured mortgages.

Supplementing the FHA was the homeloan feature of the

"G.I. Bill of Rights." Under this provision about 2 million veterans hought homes with little or no down

SOME OF THE COSTS OF BUYING A HOME I PRELIMINARY COSTS. The owner-to-be usually pays certain preliminary costs, such as property survey, service charges, and fees. These may vary from less than \$100 to \$200 or more. II. TOTAL COST OF HOUSE. ..... \$5,000 \$7,500 \$10,000 25 per cent down payment\*.... 1,250 2,500 1,875 Amount of loan needed (20year mortgage) .... \$3,750 \$5,625 \$7,500 III. MONTHLY COSTS 1. Payment on loan over 20 years (principal and interest at 5 per cent) . . . . . \$24.75 \$37.13 \$49.50 2. Taxes, Insurance, and Maintenance (based on 31/2 per cent of original cost) . .... 14.59 21.87 29.16 3. Heat and Utilities (moderately cold winters)..... 10.83 12.92 15.00 Total monthly cost to home \$50.16 \$71.92 \$93.66

Before purchasing a house the buyer should estimate all the costs of home ownership. This helps make certain that the mouthly costs will not exceed what he can afford to pay for a home.

\*With FHA insured mortgage, purchaser of a new home could make

payment and with low carrying charges. These programs helped raise the proportion of American families who own their homes to about 55 per cent.

Building by Private Enterprise

THE GREAT majority of American homes have been built by private enterprise. This means the dwel-

lings were erected for individual owners, for sale at a profit, or for investment. As new homes were huilt, many of the older buildings became available at lower prices. This provided used dwellings for families who could not afford new construction.

Most authorities agree that private enterprise can provide the major share of the new housing needed. But to build enough good homes for the lower-income groups would require lower costs and greatly increased production. Part of this twofold problem was solved after the second World War when more houses were built than ever before in history. Much of this production was in the form of large projects of a ngle family homes put up by 'merchant builders They acquired tracts of vicant land divided it into city blocks and lots and provided for water sexage and electrical connections They then built homes by the hundreds on the improved subdivisions. These Isigescale operations reduced costs and thus provided homes for many families who previously had been unable to afford good housing

Preventing Future Blight For many years the quality of such hou mg was left largely to the discretion of the builders Some created well planned neighborhoods and estal lished legally binding restrictions upon the use of the p op erty Such neighborhoods often maintain table property values much longer than the 50-year average Poorly planned subdivisions with no restrictions upon

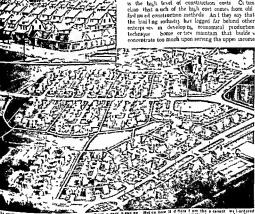
WHICH COMMUNITY WAS WELL PLANNED?

property use proved to be the nost likely sources of neighborhoo I blight

Today most cities try to insure lasting value in new develorments and to preserve values in established ne ghborhoods through zoning ordinances New busi nesses (stores or factores) are restricted to cer tam areas in the community Multiple unit dwell ings are all o restricted to certain areas to protect Be ghborhoods of single family homes. The ordinances may I out the amount of land used for buildings thus le tving ample space for playgrounds and la vns With in a re idential zone a city can control new housing by enforcing building codes. These lays specify the use of certain building materials to insure safe

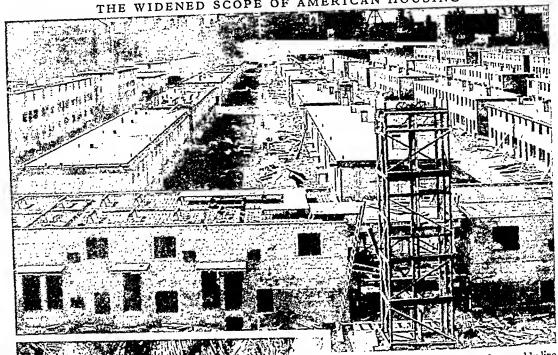
fire resistant construction Many e ties have long range plans for redeveloping blighted areas and guiding new growth. Such plan ning can prevent overcrowd ng wasteful construction and other housing errors that lead to future blight and slums Good planning also permits an economical distribution of utilities schools transportation and other city services And it increases property values thus raising tax revenues (See also C ts )

The Problem of Construction Costs The most common complaint about private bu lding is the buch level of construction costs. Ci tics clan that nuch of the high cost comes from old



p ov des ample

# THE WIDENED SCOPE OF AMERICAN HOUSING





Redeveloping a city slum area (top) requires vast sums of money. Builders must buy up land and demolish the old buildings before they can construct new housing. The cost of building on vacant land is usually less. At the bottom, children play under the palms in a Florida trailer park. After World War II more and more Americans began to explore the possibilities of life on wbeels.

levels. For example, a survey showed that in one year 76 per eent of all new housing was built for the 12 million American families with the highest incomes. In the same period less than 2 per cent of the new housing was built for the 12 million families with the lowest incomes.

Spokesmen for the construction industry have replied to these criticisms. The National Association of Home Builders denied lack of progress in the industry. It pointed to new mass-production methods in manufacture, increased use of power tools and other laborsaving devices, and assembly-line methods of construction on large-scale opera-The National Association of Real Estate Boards stated that sales to families on higher income levels usually leave vacancies in older housing and thereby increase the supply of used homes for those families who

earn less. Many attempts have been made to provide lower-eost housing by prefabrication (see Building Construction). Mass-production methods result in savings of about 20 per cent through large-scale purchasing of materials and reduced construction eosts. Thousands of prefabricated houses were built after World War II. This production was helped in part by government loans. The results, however, did not begin to meet the housing need of the middle- and low-income groups. Prefabrication was handicapped by four difficulties: (1) transporting the factory-built

house to the buyer; (2) inability to comply with many building codes; (3) obtaining the work of union labor to erect such housing in many areas; and (4) reluctance on the part of buyers to accept this new type of housing.

Greater progress was made by eo-operative building and mutual home ownership. Large-scale construction and operation achieve economies which are passed along to the buyers. Buyers may buy units they outright; or, under the mutual-ownership plan, they buy shares in the corporation which entitles them to occupy a dwelling unit.

How Demand for Government Ald Arises

Whatever the future course of construction costs may be many families will never be able to buy or rent new housing at full value

This situation raises the problem of how to meet their needs. One method is to provide adequate housing

in the older neighborhoods

Repairs can be profitably made as long as property values remain stable. But it neighborhood decay sets in, private owners and builders can do little or nothing to arrest it. They cannot profitably erect new homes. They cannot condemn property in order to remove undesirable structures. They cannot levy special assessments to meet the cost of improvements in the neighborhood Action by some government authorities having the necessary power is required Problems Involved in Slum Clearance

In slum areas government action becomes unperative All housing in the area must be torn down Stores, factories, and other undesirable features must be removed. Through traffic should be rerouted to create quiet safe residential surroundings. Then new

housing must be constructed

All this requires expenditures of huge sums of money, but most of the people in the area cannot pay rents that would repay the costs of reconstruction For example after a detailed study Federal government agencies estimated the cost of building and maintaining a public housing unit at 554 49 a month But the highest possible rent that could be expected was about \$30 a month The difference of \$24.49 had to be made up in other ways

A final problem in slum clearance is providing shelter for those dispossessed by huge slum clearants projects Mere dispossession would only force many families into already crowded areas. Thus slum clearance should be accompanied by building on

vacant or nonresidential land

Government Aid to Private Enterprise

Circus states and the Fed eral government have all helped provid housing But government bodies do not have enough money to replace all the slums and substandard housing in the United States Therefore efforts have been made to enlist private enterprise to do part of the work

Under this plan a local government agency obtains title to blighted areas. It may do the by purthase, or, under the right of emment domain it may condemn the land and pay prices set by a court The local agency then sells or leaves the sate to a pri vate company, which constructs and manages the new bousing The local agency may also provide some form of indirect subsidy or assistance This en ables the private company to charge a lower rent and still make a profit

Subsidies to Reduce Casts

One form of subsidy is to exempt the buildings from taxation for a period of years. In return, dwidends (profits) are limited to about 6 per cent Under this 'hmited-dividend' plan, Knickerbocker Village was built in New York City in 1934 houses 1 600 families of moderate income

Cities provide another form of subsidy by acquiring a slum site at market value and then selling the property as vacant land (This lower price is called the 'write-down ) Government funds pay for clearing the area as well as the difference between the purchase price and the write-down price. This subsidy enabled one company to buil I a large-scale housing project in Chicago The new construction replaced a hundred acres of blighted homes

With the aid of such subsidies insurance companies and other institutions have made long-term investments in housing projects in several cities. One such project was Parkchester built by the Metropolitan Late Insurance Company in New York City in 1941 It houses 35 000 people of the middle income group

Because of the high cost involved private enterprize and local governments made only limited progress in slum elearance But under the Housing Act of 1949 the Federal government entered the field on a vast scale. The act authorized one billion dollars m loans for slum clearance. It also provided each grants to pay two-thirds of the loss incurred in preparing blighted areas for private development

Public Action to Provide Housing

Movr authorities believe that private enterprise, with some government aid can brovide standard howing for all but the lowest-income femthes One method of providing adequate low-rent

homes is publichousing This is usually administered by a local government agency called the housing authority The housing authority initiates public housing It acquires the site and contracts with private comnames to clear the land (if necessary) and build the project The authority then manages the housing

It scales rents to what low meome families can afford rather than at a level which would repay all costs. The resulting deficit is paid by the local government with help from the state and Federal governments for approved projects

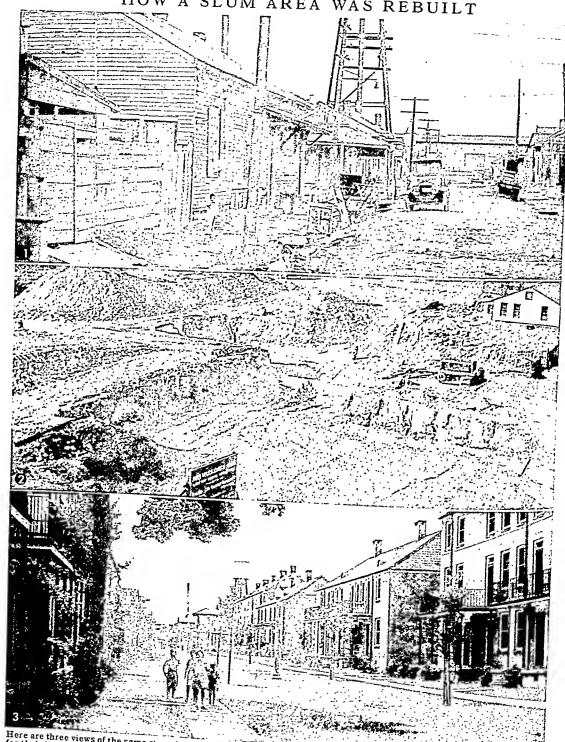
Under the Housing Act of 1937, 191 700 low rent public housing units were built in 268 communities The Housing Act of 1949 provided funds to help pay for the construction and operation of \$10 000 additional units in six years. Many of these projects were to be built on vacant land to house fow income families dispossesse I by slum clearance programs

Arguments about Public Housing Widespread and bitter objections have been made to public housing on many grounds. Some critics

have urged that it is unfair to provide new housing at lower rentals than those paid for older, less desirable accommodation, and then meet the cost by raising the taxes of those who are already paying fully for their own housing Another objection has been that public housing is a blow at private enterprise in the construction and property management fields

Public housing advocates claim that private enterprise is not affected since it never did clear slums,

# HOW A SLUM AREA WAS REBUILT



Here are three views of the same street in New Orleans, La. 1. The cramped, worn-out slum dwellings provided poor housing for their inhabitants. There is little incentive for persons to fix up their homes in such a neighborhood. 2. Aided hy funds from the Public Housing Administration the city hought the land and demolished all the old huildings. 3. The entire area was then redeveloped according to plan. The homes now provide adequate, low-rent housing in a pleasant attractive neighborhood.

and could not make a profit at rentals which lowincome families could afford. They maintain that the tax burden would be more than offset by reheving the high cost of public services in slum areas by reducing delinquency and erithe and by generally

improving the standard of living in the city Public housing has also been entreased because it pays no taxes. But such projects do pay a service fee to the city This payment may be up to 10 per cent of the rent charged Public housing advocates claim that this fee usually matches or exceeds the

tay revenue obtained from the old slum site Public Housing in Europe

Most of the nations of the world have also had a

housing problem. In Europe the shortage was made worse by the destruction resulting from two world wars Between wars, however several nations built public-housing projects to provide low rent homes Various governments also made long term loans and gifts of land to cities and building succeties for bousing projects

Much of the new housing in Sweden and elsewhere was built by cooperatives After the second World War, housing construction depended largely upon how fast the nations rebuilt their commerce and industry

Housing Legislation

GOVERNMENT and to housing began in 1867 when New York state passed the first

In the United States

tenement house law in the country. It authorized 'the use of police power to regulate the use of private property as tenements in the interests of health, safety, and morals " A more far reaching New York law, passed in 1901, forbade building tenements with inside rooms But the "old law" homes remained in use

In 1918 the Federal government built duellings for workers in war industries After the war a California bond issue provided the means for low meome war veterans to buy homes and farms and to pay for them in 20 years Beginning in 1926 New York State aided housing by granting partial tax exemption to approved limited-dividend projects

Large-scale government aid to hous mg began in the 1930 s when economic depression brought widespread distress Federal loans and loan insurance helped check the loss of many homes The Housing Division of the Public Works Administration built 51 projects housing 21 500 low income families in more than 30 cities This action also provided employment for workers in the building trades

The National Housing Act of 1934 has been amended many times to stimulate home ownership and housing construc-

tion through low interest, long term mortgages. Its chief agencies were the Federal Housing Administration which guarantees repayment of approved loans, and the Federal Savings and Loan Insurance Corporation which insures savings deposits up to \$10 000 in approve I institutions

Housing after the Second World War

During the second World War the government built temporary housing for thousands of workers in sital industries. After the war emphasis shifted to relieving the bousing shortage. The Federal govern ment helped veterans meet the cost of new housing by providing loan insurance and buying mortgages for resale to investors

In 1947 a new law consolidated most federal housing activities under the Housing and Home Finance Agenes (see United States Government) Federal aid for dim elearance and public housing, which began in 1937 was greatly broadened by the Housing Act of 1949 This act also authorized 300 million dollars in loans and grants to aid farm housing

In 1953 the Census Bureau reported that housing conditions were improving. However, there was need for even more improvement. The extension of federal rent controls into 1953 indicated severe housing shortages in some urban areas Moreover, construction would have to remain at peak levels to provide new housing for a rapidly growing population (For Reference-Gutline and Bibliography see Shelter )



m and sold to Swedish citizens on the installment

### A HERO OF TENNESSEE AND TEXAS



This picture shows Sam Houston when he was 64 years old, after he had served as governor of two states

HOUSTON (hūs'tŭn), SAMULL (1793-1863). People called Sam Houston "Six Feet Six" because he looked big and did big things. In the War of 1812 he 10se from private to lieutenant. At the battle of San Jacinto he commanded the troops that won independence for Texas. He served Tennessee as congressman and governor, and Texas as senator and governor. He was twice president of the republic of Texas.

Sam was the son of Maj. Sam Houston, who stayed in the army after the Revolutionary War. Sam was born in Rockbridge County, Va., March 2, 1793. After Major Houston died, Sam's mother moved with her children to a farm in Tennessee.

The boy did not like school but he read a great deal. When he was 16 his older brothers got him a job in a village store. Disliking storekeeping, he ran away to live with the neighboring Cherokee Indians. Their chief, Oolooteka, adopted Sam as his own son. He lived with the Cherokees for nearly three years and visited his family only occasionally.

Sam returned home and opened a log-cabin school. But he soon volunteered for duty in the War of 1812. He served under Andrew Jackson against the Creek Indians. He was a capable soldier and rose through the ranks to a commission as heutenant. In 1814 he was wounded at Horseshoe Bend, Ala.

By this time Sam had reached his full height of six feet two inches. He had long brown hair and keen gray eyes. Jackson liked his young officer and after the war helped him become a subagent for the Cherokee Indians. Houston retained his commission until 1818. He resigned from the army because the secretary of war, John Calhoun, reprimanded him when Sam came to Calhoun's office in Indian dress.

Houston returned to Tennessee and studied law for six months. In his first year of practise he was elected district attorney. Houston enjoyed politics He was an expert stump speaker and dressed colorfully in either white men's or Indian clothes. Again aided by Jackson, he was appointed major general of the Tennessee militia in 1821. Two years later he was elected to Congress, and in 1825 he was re-elected. He was only 34 years old when he was elected governor

In 1829 Houston married. The marriage was a failure, and the couple separated. Deeply grieved, Houston resigned his office and quit his campaign for reelection. When the Cherokees were moved to a new home in Arkansas, he followed. For six years he traded with them and acted as their adviser. Several times he traveled to Washington, D.C., to fight for their rights. During this time he visited Texas. He became interested in the demand for separation from Mexico.

Texas declared its independence in March 1836 and established a government (see Texas). Houston was chosen commander in chief of the army raised to battle General Santa Anna, the Mexican dictator who had marched north to put down the revolt. Houston retreated before Santa Anna's advance until he lured the Mexicans into a trap. Then on April 21, 1836, Houston attacked Santa Anna at San Jacinto. In 15 minutes the battle was over and Santa Anna was taken prisoner. Texas independence was assured.

Houston was elected president of the new republic. He administered his office wisely but under the laws he could not succeed himself. He served a term in the Texas congress, and in 1841 became president again. Meanwhile in 1840 he had married Margaret Lea of Alabama. They had eight children.

Houston worked hard to have Texas annexed by the United States. He succeeded in 1845; and the annexation brought on the Mexican War. Houston refused a general's commission but served as senator from the new state. He was defeated for governor in 1857 but was elected in 1859.

The Civil War was a difficult period for Houston. Most Texans were for the South, but Houston believed that the Union must be saved. In 1861 he was deposed as governor. He refused the offer made by Union soldiers to return him to office. He died July 26, 1863, in the middle of the Civil War.

HOUSTON, TEX. Standing in the center of the rich Gulf coast oil fields, Houston is the biggest city in the Southwest. Its port, one of the busiest in the nation, ships petioleum products all over the world. Its skyscrapers hold the offices of the nation's important petroleum companies. But oil production is only one of Houston's many activities. It is a booming industrial and financial center as well.

Houston is on Buffalo Bayou (a river), 50 miles inland from the Gulf of Mexico. Houston Ship Channel (opened 1914) follows Buffalo Bayou to the San Jaeinto River and crosses Galveston Bay to the Gulf of Mexico. The channel is dredged 34 feet deep and has a width varying from 200 to 400 feet. In the city is a large basin where ships can be turned about Houston is served by s v rail systems buy and truck lines and domestic and inter national airlines

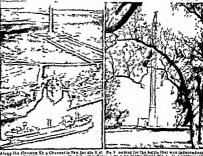
Chechmaters warm ad mot bummer tems eratures often reach 100° F The annual ramfall 13 about 46 inches Pine vaunon cotton wood sycamore oak swamp bickory and graceful magnolia trees grow in and about the city Most Houston homes have gardens of azalens roses camellas and other flowers in bloom much of the year

Many of the 1 lustnes are built along the Houston Ship Channel Tiey m clude oil refineries

chemical companies synthetic rubt er plants par er a l'flou n lis e ent

factories a steel plant and al | yar le In the city are Rice Inst tute the University of Houston Baylor Medical College the Un versity of Texas School of Dentistry and the Texas Southern University After the second World War the build ng of a 100-million dollar med cal center was begun Houston has a notable livary art moseum nl

HOUSTON MONUMENTS TO MILITARY VICTORIES



for Toxas At left a tanke passen the bat eatin Texas a re a so of two World Wa o It sperm men ad he e Beyens a the San Jac nin Monament A the ribs as close yew of the 570 to

ynglony ordestra. Only a few miles east of the uty hes an Jacinto State Park

### Houston a Colorful History

Before 1836 the site of Houston was an uninhabited more uto- afested marsh In that year two brothers John K and Augustus C Allen bought the site for one lollar an acre. They la d out streets and name l the town for the Texas military hero Gen Sam Hous-

ton The city became the first capstal of the republic of Texas It served as capital in 1837 39 and again briefly in 1842 during the Arch ve War (see Texas)

The city became a port for shallow draft boats Lumber nice and beef were processed and shipped By 1890 Houston had four rathroads cotton seed-oil plants carriage and wagon factories breweries and busy saw milis The city boomed with the gush of the Gulf coast oil fields (see Petroleum) During the first World War it became an important in litary center In the second World War Houston s industry expanded with a \$30 000 000 government chemical manufacturing program

After the war new buildings and new highways were built and the Houston Ship Channel was improved In 1947 a mayor-council replaced the city manager form of government In 1949 Houston's corporate area

#### HOUSTON S BUSY INLAND PORT



was enlarged to include about 155 square miles. This annexation doubled the original size of the city and increased Houston's population by an estimated 100,000. Population (1950 census), 596,163.

Howe, Elias (1819-1867). Before Elias Howe invented the sewing machine, the fastest needlewoman could sew by hand only 50 stitches a minute. Howe's invention stitched five times that fast. At first Howe found it difficult to sell his machine. Eventually his sewing machine established mass production of clothes and other sewn goods.

Elias was born in Spencer, Mass., on July 9, 1819. His father worked a small farm and a grist mill and did odd jobs. Elias, though small and lame, helped his father. In Lowell, when he was 16, he got a job in a factory making cotton-weaving machinery. Two years later the panic of 1837 threw him out of work. Elias' search

for a job took him to Boston. There he found work as a machinist. He married in 1841. About this time he overheard an inventor speak of the need for a machine that would sew.

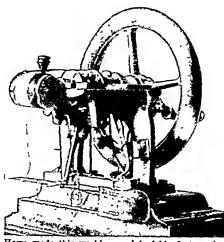
The problem interested Howe. First he tried a needle pointed at both ends and with an eye in the middle. It was not successful. Then he thought of a machine that made a lock stitch (see Sewing Machine). Howe left his job to work on his invention. He tried to support his family of three children by doing odd jobs. But he could not make enough money. He moved his family into his father's home. A little later he interested a friend, George Fisher, in his machine. Fisher invited the Howe family into his home and gave Howe money to go on with the invention. In April 1845 Howe completed his first successful sewing machine and looked for buyers.

But tailors and other garment people were afraid that the sewing machine would throw them out of work. Howe patented his invention and struggled on. He sold the English rights for \$1,217 and went to London to adapt the machine to the buyer's special needs. Howe's wife died soon after he returned to the United States.

While Howe was gone, American manufacturers stole the invention. Howe sued them. His rights were recognized by the courts in 1854. Not long after, sewing-machine sales brought him \$200,000 a year, and he began to enjoy his wealth.

Howe remarried. When the Civil War broke out he helped to outfit a Connecticut regiment. He himself enlisted as a private. But a soldier's life was hard on the frail middle-aged man. In 1867 he died in Brooklyn, N. Y.

THE FIRST SEWING MACHINE



Howe made this working model of his first sewing machine for submission to the Patent Office. It secured his rights to the new invention.

HOWELLS, WILLIAM DEAN (1837-1920). During his last years William Dean Howells was recognized as the dean of American literature. He wrote more than 75 novels and numerous farces and comedies, essays

and criticisms, and poems. As a writer, a magazine editor, and a critic he helped develop the school of realism in American fiction.

The son of a migratory printer-editor, Howells was born at Martin's Ferry, Ohio, on March 1, 1837. When he was nine he began to set type in his father's shop. He did not attend high school or college. But he studied foreign languages in a windowed nook below the stairs of his home and learned much of the literature in those languages. Between 1856 and 1861 he worked on the Ohio State Journal at Columbus as reporter and editor. In 1860 he published a book of poems and a life of Lincoln that sold widely be-

cause of the presidential campaign. On the proceeds he went to New England, where he met the writers Lowell, Emerson, Holmes, and Hawthorne. In 1861 Lincoln appointed him consul at Venice. In 1862 he married his Columbus sweetheart, Elinor G. Mead, in Paris. They had three children.

Howells returned to America in 1865. After a few months in New York, he was appointed subeditor of the Atlantic Monthly in Boston. In 1871 he became editor in chief. Howell's first novel, 'Their Wedding Journey' (1871), was written in Boston. Howells left the Atlantic Monthly in 1881 and devoted himself to writing. In 1891 he moved to New York and for a few months was editor of Cosmopolitan Magazine. Later he went to Harper's Monthly. Here, from 1900 to his death, he conducted 'The Editor's Easy Chair', a review of contemporary life and letters. He was the first president of the American Academy of Arts and Letters and served until he died.

Howells was tolerant and democratic. He believed that art should serve morality and that it is a writer's duty to present life realistically rather than in amusing or heroic patterns. He strongly believed that everyday American life provided the most worthy material for American literature. His own writing fulfilled these beliefs. Howells' books possess a quiet charm that continues to hold a small but enthusiastic audience. (See also American Literature.)

Among Howells' best-known novels are: 'Their Wedding Journey' (1871); 'A Foregone Conclusion' (1875); 'The Lady of Aroostook' (1879); 'A Modern Instance' (1882); 'The Rise of Silas Lapham' (1885); 'Indian Summer' (1886); 'A Hazard of New Fortunes' (1880); 'The Late of Silas Lapham' (1886); 'A Hazard of New Fortunes'

(1889); "The Kentons' (1902).

HUDSON, HENRY (1575? f611) By Henry Hudson s t me European nations were doing thriving business in soices and silks with the Quent But the old eastern sea route was fong, slow and costly and men dreamed of finding new waterways to the Far La t. They reasoned that if they could sul northeast on northwest through polar waters they could descend along the Siberran coast and reach China and the Indes Henry Hudson tried to find both a northeast and a northwest passage. He failed but his four toyages added greatly to man's knowledge of the Aretic and North America

Lattle is known of Hudson before 160" Hrs fan ilv may have been interested in the Muscous Company an English trading firm. Hudson's first two sources were for this company On the first venage in 1607 he sailed to the east coast of Greenland then east to Snitsbergen But he could not find a pursuage through the polar ice barrier. Hu leon's son John went with him on this and the later voyages

On Hudson's second voyage in 1608 he tried the Arctic Ocean north of Europe and Asia. He reached Aqyaya Zemlya but was turned back by me in haia

Strat the pass between Durope and Novaya Lemba The next year Hudson commanded the Half Moon for the Dutch East India Company Again he tried the northeast passage Off the coast of Nevaya Zemlya the crew sebelled against cold and hards up So Hudson sailed south and westward to America

He explored the inlets southward along the coast to southern Virginia probing for a passage across the continent. He then turned north to the river that now bears his name the Hudson and sailed up it to the present site of Albany

A group of Englishmen backed Hudson a fourth loyage (1610-11) They gave him the Discovery and a crew of 25 men By and-July the ship reached Rudson Strait the en trance to Hudson Bay Hudson but down a mu tay He sailed into Hud son Bay an I explored the east coast to its southern toost reach in James Bay There the ship was icebound during the long Aunter of 1610-11

fa June the Discovery broke loose from the see and sailed north Again it was caught by no floce Not of the even muto ned lfud-ou lus son

and even wik men were forced into a small boat and set adult to persh Several mutineers were killed by Lskimos The survivors brought the Discover! back to England and a ere tried for muting

HUDSON BAY The third largest landlorked sea of the world is Hadson Bay It lies in northeastern Canada and extends 800 miles from north to south an ! 390 miles from east to nest. The total nater area 18 470 800 square miles The average depth is 420 feet but James Bay tle faithest south extension of Hudson Bay is quite shallow

Among the many rivers that flow into the bay are the Velson and the Churchill Hudson Bay connects at the north with the Arctic Ocean through Fury and Hecks Straits and Foxe Channel Hudson Strait the passage east to the Atlantic Ocean, is a deep goige of varying with grooved out of solid lock. The east and northeast shores have high bluffs. Low snamps border James Bay Forests of spruce bal am, and or lar border the southern shores but the limit of trees is reached a few miles south of Churchill Can bon musk ox many kinds of fur bearing animals and birds are plentiful and the bay has salmon pornoise whale an Lother fish

Eskimos and Indiana live by hunting fishing and trapping In the summer a Hudson a Bay Company ship causes supplies to the trading posts along the chores and t cks up furs. The bay does not freeze lut it is filled with dr fting it e for nine months

The largest town is Clurchill \Lanitoba on the west shore The Hul son Bay Railroad con nects it with The Pas 510 miles to the southwest Churchill has a fine mod em harbor at the mouth of the Churchill Eiver and a grain elevator with 4 capacity of 212 million bushels During the sum mer wheat is shipped from Saskatcheurn to Churchill for export to the United Kingdom Manufectured preducts are slamed as for destobutum in central Can ada A large imhtary anport is maintained jointly by Canad 1 and tl e United States Fort Prince of Wales across the river, is a national historic park (see National Parks)

Hulson Strait was entered by the Cabots m 1498 (see Cabot) Hudson Bay was first explored by Heury Hudson in 1610 (see Ifuelson)



HUDSON RIVER. Fascinating legends, interesting stories of history, and picturesque scenery combine to make the Hudson River one of the most renowned rivers in the United States. The excellent harbor which its mouth affords has helped New York City to become the greatest city of the New World.

Rising in the heart of the Adirondacks in the northeastern part of the state, the Hudson is at first narrow, winding, and rock-obstructed, and then flows past wooded hills and cultivated slopes until it reaches tidewater at Troy. Here it is joined from the west by its chief tributary, the Mohawk. From Albany down it is like a long arm of the sea, broad and stately. The Catskill Mountains rise in varied heauty on the west side of the river. Lower down, the Hudson enters the Highlands, the scene of Arnold's treason and Andre's death, a region of rock-ribbed hills and mountains. The United States Military Academy at West Point and the ruins of Fort Putnam are situated a few miles below. Emerging from the Highlands near Stony Point, where "Mad Anthony" Wayne stormed and captured the British stronghold, the river expands to form the Tappan Zee (or Bay). Thence the Palisades, a wall of rock 300 to 500 feet high, majestic and awe-inspiring, extend 20 miles along the New Jersey shore. Just south, near Weehawken, the Burr-Hamilton duel was fought. The banks of the much traveled waterway, once covered by forests, are dotted with towns, hamlets, and country estates, until New York City's many docks and wharves are reached. Then the river empties into New York Bay, 306 miles from its mountain source.

An Aid to Early Development

The Hudson River was first explored in 1609 by Henry Hudson, from whom it gets its name. In early days the name North River was often applied to it, to distinguish it from the Delaware, or South, River, and this name is still given by New Yorkers to its lower part. Since the Hudson furnishes the only deep waterway through the Atlantic highlands open to large vessels, it greatly aided the early commercial and industrial development of New York. Before railroads were built it carried nearly all the traffic from the fertile country of the west and north. The first successful attempt at steam navigation was made by Robert Fulton on this stream, and with the opening of the Erie Canal from Troy to Buffalo in 1825 a continuous waterway connected New York City and the North Central States. Ocean-going vessels still travel up as far as Troy, where they are loaded with freight which has come by water from Duluth or other western points through the Great Lakes and down the Erie Canal. The falls and rapids furnish electric power which is used as far away as the coal fields of Pennsylvania.

HUDSON'S BAY COMPANY. Scattered over the vast northern regions of Canada, up to the shores of the Arctic Ocean, lie the fur-trading stations of the great Hudson's Bay Company. For nearly 300 years these have been the outposts of civilization in a remote and lonely land. More than 200 such posts are

located along the shores of Hudson Bay, James Bay, and the Arctic Ocean and throughout interior western Canada.

Each post consists of a bungalow in which the manager and his family live, a warehouse, and a store. Two-way radio and the airplane which brings in supplies from the company's merchandise depots in the south help relieve the lonesomeness of the posts. Indians, Eskimos and half-breeds bring to the posts their stock of furs accumulated by the winter's trapping. They trade the pelts for food, weapons, and clothing in the company store. The pelts are then sent by airplane, ship, or light-draft river steamboat to "gathering centers" in the larger cities of southern Canada. From the gathering centers they go to the fur-marketing centers of Montreal, New York City, and London.

About the time of the first World War the company began expanding its wholesaling and its retail store activities. It now has the third largest chain of retail stores in Canada. The company operates its own airplanes and its own fleet of ocean ships and river boats.

Boundless Wealth in Furs

The early history of this company and its rivals is closely tied to the history of northwestern Canada. The Hudson's Bay Company began in 1670. Two French adventurers, Radisson and Groseilliers, had lost a fortune in furs to greedy government officials in Quebec. Enraged at the refusal of the French court to listen to their appeals, they took their tales of

vast wealth to the English government.

King Charles II and his cousin Prince Rupert were fascinated. The king granted a charter to the prince and 17 associates, creating the "Governor and Company of Adventurers of England, trading into Hudson's Bay." This gave them sole rights of trade in the lands drained by rivers and streams flowing into Hudson Bay. They did not realize the vast extent of "Rupert's Land," as the territory was called. It covered Ontario; Quebec, north of the Laurentian Mountains and west of Labrador; all Manitoba; all Saskatchewan; and the southern half of Alberta. In 1821, when the company absorbed the rival North-West Fur Company, its vast holdings reached into what is now the northwestern United States and up to the Arctic Ocean. (See also Furs and Fur Trade.)

The Hudson's Bay Company had far more than trading privileges, for it also owned the land and governed the people. This arrangement was found intolerable when settlers moved into the region. In 1869 the company was forced to sell most of Rupert's Land to the new Dominion of Canada (see Canadian History). Subsequent sales have reduced its holdings to about 370,000 acres. Prospecting for oil is one of its

newest activities.

HUGHES, CHARLES EVANS (1862-1948). Chief justice of the United States, member of the World Court, secretary of state, and governor of New York State, Charles Evans Hughes was a national figure for many years. He was born in Glens Falls, N.Y.,

the son of a clergyman of Welsh descent He received his A B from Brown University in 1881 then taught school while studying law, and going to New York City was graduated in law from Columbia University in 1884 being admitted the same year to the bar

He first attracted wide attention in 1905-06 by the searching way in which he con ducted the investigation for a committee of the New York legislature of the great insurance commanies in several of which scandals had become notorious Before this Hughes had become a marked figure in New York state by a similar investigation of New York gas rates then just con cluded He accepted the new commission on condition that he should be absolutely unhampered freedom from bias and his extraordi

many capacity for analysis of monumental masses of detail as well as for hard work-sometimes 20 hours a day - appeared in the results Most of the recommendations made

in the report he drafted were later enacted into lan-Elected governor of New York state on the Republean tacket for two successive terms (1907-08 1909 10) Hughes showed the same vigorous courage ia forcing a reluctant legislature to pass various reform messures which included an anti-race-track gambling law, a direct primary law and particularly a law creating a public service commission the outstand ag schievement of his administration shoushed back stairs influences refusing private interviews to influential politicians and cleaned house by eliminating honest but incompetent officeholders as ruthlessly as the corrupt ones without regard to party services in either case. A firm be hever in the party system he was too honest too uncompromising, and too deficient in the arts of

popularity to become a party leader Governor Hughes resigned his office in 1910 to accept an appointment from President Taft to the United States Supreme Court—a position admirably so ted both to his tastes and to his abilities. He tanked as one of the ablest men on the bench and so long as he sat there he remained absolutely dis

severed from politics

It was undoubtedly much against his own meh nat on that he resigned his position on the Supreme Court bench to accept the Republican nomination for the presidency against President Wilson in 1916 The party platform was vague with reference to the war and the campaign centered on butter attacks on Democratic policies Whether for this or for other reasons many of Mr Hughes admirers felt that his campaign did not add to his reputst on He was defeated in November (see Wilson Woodrow) and beturned to the practice of law In 1918 President Wilson appointed him to conduct the investigation of charges of extravagance and corruption in the building of airplanes for the army and navy

From 1921 to 1925 Hughes served as secretary of state and handled many momentous assues including the peace treaty with Germany and the Washington disarmament conference In 1926 President Coolidge

appointed him to the Hame Court of International Arbitration, and in 1928 he was elected a judge of the World Court Two years later he was appointed chief justice of the United States In 1941 he retired at the age of 79

HUGHES, Str. SAM (1853-1921) As Canada's minister of militia and defense at the start of the first World War in 1914 Lieutenant-General Hughes raised and equipped for overseas service a very large part of the 600 000 men that Canada contributed in that eleantic conflict and they were said to be among the best of all the British forces A man of force

and energy he showed an ability m organization that amounted to genius recognized no obstacles either for himself or others If anyone complained that the task be set was im-

possible his reply was Nothing is impossible Do 1t

Born on a farm in Oatsmo of Protestant Irish stock young Hughes enlisted in the militis in his 13th year and at the age of 17 won a medal for service against the invading Fenians who were seek me the overthrow of the British government in Canada He was educated at the Toronto Normal School and Toronto University and taught school for a number of years Then he took up newspaper work purchasing the Lindsay Warder, which he elited himself until 1897 In 1892 he was first elected to the Canadian House of Commons and from that time he played a prominent part in public affairs One of the pr neiples he strongly advocated was that the Colonies should assist the Empire in time of war During the South African War he offered his awastance in raising troops besides serving in the intelli gence and transportation departments. He was

several times ment oned in dispatches Ever since his youth he had made a special study of military affairs and hadrisen in rank from private to hentenant-general of militia. His political and mili tary knowledge and experience fitted him for the office of mmister of militia to which he was appointed in 1911 In spate bowever, of the splendid results he obtained as an organizer and the esteem which he gamed at first his administration of the militia office was hitterly criticized He was charged especially with being rash and arbitrary in his actions and these attacks led to his resignation of his office in 1916 The British government rewarded him for his services by creating him a Knight Commander of the Bath



CHARLES EVANS HUGHES Staleyman and Reformer

# HUGO, MASTER of POETRY and ROMANCE

Hugo, Victor (1802-1885). On June 1, 1885, Paris celebrated the most magnificent funeral of the century. In a pauper's hearse, the remains of Victor Hugo, the sovereign poet of France, were carried for burial to the Panthéon. The pauper's hearse, which Hugo had requested in his will, was a symbol of his brotherhood with les misérables, "the unfortunates."

In his life, however. Hugo had enjoyed worldly success and fame without a parallel among writers. "No one," said Emile Montegut, "has stirred so much wrath. furnished pretext for so many literary civil wars, roused such fanatical enthusiasms, kindled such unshakable devotions." Once in his hearing, regret was expressed that Paris was not rechristened Hugopolis. "That will come," malice reports Hugo to have said. Such was the extravagance of Hugoworship at the time of his death, that his enterprising valet was able to sell four hundred pairs of trousers that he swore had all been worn by Hugo.

There was an imperial vigor about the man and his manifold works. He ate his meat almost raw, he liked to bathe in ice water, and in his 83 years he never lost a tooth.

His will was iron, and his capacity for work was incredible. "Take a moment's rest? Impossible!" he used to say. "A little work bores me, but much work is a pleasure." For more than 60 years he worked, prodigiously and with frenzy.

Parentage and Early Years
Victor Hugo was born at Besançon in eastern
France, Feb. 26, 1802. On his mother's side he sprang
from shipowners; on his father's, from a carpenter.
Between his mother, who was a professed royalist,
and his father, who was a supporter of Napoleon,
there was a lack of understanding that ended in a
separation when Victor was in his teens. From his
mother, whom he adored, Victor learned to waste
little love either on Bonaparte or on his father,
Gen. Joseph Léopold Hugo, who was an officer in
Napoleon's army. During the early years of Victor's

life, while his father was fighting or doing garrison duty here and there, Madame Hugo was in Paris with her three sons—Abel (born 1798), Eugène (1800), and Victor. His fifth year was spent in Italy with his father, who was now governor of a province and chief adviser to Joseph Bonaparte, Napoleon's brother.

Barely had the Hugos begun to get settled in Italy

when Napoleon conferred upon Joseph Bonaparte the crown of Spain General Hugo went to Spain with him, and Madame Hugo took her boys back to Paris. There she rented a roomy old house with a huge garden full of trees. This property, once part of the ancient convent of the Feuillantines, had run wild. It was as if it had slipped out of the covers of some Gothic romance and dropped there by some caprice of enchantment In this enchanted garden, Victor had for playmate a little girl, Adèle Foucher, who later was to be his wife.

Meanwhile, in Spain, Victor's father also was living in a kind of fair, talc. Overnight he had been created general of the staff, governor of Madrid, Count of Cifuentes and Marquis of Siguenza. The King had given him a million réals and a magnificent palace.

and a magnificent palace. He summoned his family to share his splendor. Abel, the eldest son, became a page at the king's court. Victor, who was now nine, and Eugène, two years older, were entered in a school for young Spanish nobles. Hated as enemies and despised as heretics, the two boys passed several unhappy months in this dreary place.

Reversal of Family Fortunes

It was the defeat of Napoleon's armics in Russia (1812) that broke the nightmare, and released Eugène and Victor to return with their mother to their beloved home in Paris. The same upheaval left General Hugo a poor man, stripped of his titles and reduced in rank. Madame Hugo gave up their beloved garden nome and moved into a shabby apartment. The boys were sent off to school. For the next three years Victor enjoyed the only systematic education he ever had.



The poet's "imperial vigor" plainly appears in this portrait, painted when he was in his seventies. His snowy-white hair and beard frame his "lion's face," as admirers called it, with its wide and lofty forehead—"one of the finest laboratories of thought in the world." He had a powerful body that rarely knew fatigue or illness.

At school Victor not only distinguished hunself m his stud es but found time to read deeply in literature and to write thousands of lines of verse. When he was 15 the French Academy gave him honorable mention in its annual poetry competition. After leav me school at 16 he devoted himself entirely to literature The next year le won two prizes in a poetry contest at Toulouse With his elder brother Abel he founded and edited a literary review. Must of the articles and poems were written by Victor himself

The heartbreak of his mother a death (1821) the burt at his father a absence from the funeral and his o in lack of means did not break his determination to live-or die-by his pen. He continued to write. His first published volume of poems (Odes et Poésies diverses ) pleased the King and non for him an annual pension of 1 000 francs (\$200) that later was doubled It also brought a profit of 700 france Then at 20 he married his childhood playmate. Adele Foucher

Poet of Hearth and Home Marnage brought him four children whom he adored (not counting the first infant that lived only a few months) There was Léopoldine who from the first hour of her life was her father a darling and whose death by drowning just after her marriage seared his heart There was the gay Charles who gave Hugo two grandchildren that he doted on in later life There was François-Victor whose translation of Shakespesse is still the best and most complete version in French And there was Adèle of deheate health but the only one of his children who outlived him Nonther French man has written so much tender poetry of childhood

and children the family and the home Leader of the Romantic Movement

Out of the happiness of his early married life and the remembrance of the Spain of his childhood Hugo created a work which brought him spectacular acclaim and his first substantial earnings. The hero of this yncal melodrama Hernam is a bandit ch ef whose heart is pass onately given to Dona Sol the daughter of an ancient race Unhappily Dona Sol is promised in marriage to her aged uncle Ruy Gomes Hernam was her but their nuptial hour is the hour of their

Hernani (1830) was Hugo a first great traumph. It al o marks an epoch in the history of French drams. At the time of its production the French theater was be og strangled by a set of petty and artificial tradi tions Hernani rudely shattered the trad tions and brought fresh new life into French literature Thus before he was 30 Hugo was the acknowledged chief of the literary rebellion called the Romantic movement

It was predicted that his flame would soon burn itselfout but poems plays essaye historical sketches and novels followed one another steadily for half a century more Hugo had such richness of imagination splendor of language and such command of tech mque that he triumphed over serious faults of hasta ness and extravagance

Hugo was tremendously in earnest as patriot and

social reformer and many of his works are impassioned enticism of social and political injustice. As a political opponent to Napoleon III whom he nicknamed Napoleon the Lattle Hugo made himself so dangerous that he had to flee from France

Twenty Years of Exile

In Brussels and on the island of Jersey Hugo found only temporary refuge After 1855 on another island in the English Channel he enjoyed a world wide celebraty as the Exile of Guernsey Tl cre he wrote notable historical papers poems toat are ranked with the greatest achievements of French genius and novels that were translated into many languages

Always at the boding point of ferror Hugo was often merely violent over the passing event but he was occasionally carried away by passion to the point of inspiration on themes of universal interest M sérables is justly ranked with the greatest novels of all countries in comparison with it Hugo s otler novels dwindle into secondary importance

Though Hugo wrote a number of plays some of which were enthusiastically received at the time he does not now rate highly as a dramatist As a roetespecially a lyric poet-1 e is still honored as the greatest that France has produced Les Châtimente is a

collection of his finest lyrical poems

After the fall of the empure of Napoleon III in 1870 Hugo returned to Paris where he lived as a popular s fol II s songs were set to music his interdicted play Le Ro e amuse (The King & D version) was revised and he was the chief figure of the French Academy When he die ! (May 22 1880) at the age of 83 Par harment gave h m burnel in the Panthéon-sn honor which hal been accorded to no one for 75 years

Books by and about Hugo

Vetor Hugo a princ pal works of fiet on are Notre Dame de Paris (1831) Les Misérables (1862) Les Travailleurs de la mer (Toilers of the Sea) (1866) Quatrevingt-treize (Ninety three) (1874) Poems and poet c dramas Cromwell (1897) Merion Delorme (1879) Les Orientales (1829) Hernani (1830) Le Roi e amuse (The Ling's Dive sion) (1832) Rus Blas (1838) Les Châtaments (1853) Les Contemplations (1856) La Légende des sècles (three senes-1859 1877 1893)

Good b ograph es of Hugo are Victor Hugo by A M F R Duclaux (Holt 1991 op) Tle Career of Victor Hugo by E M Grant (Harvard Un v Press 1945) and Victor Hugo a Real stic Bography of the Great Romantic by Matthew Josephson (Doubleday 1942 op)

A Masterp ece of World Literature Les Miserables'

Victor Hugo was 60 and at the zenith of his power when he wrote his masterpiece. Les

Misérables (la me-za-ra blă) He was m exile in Guernsey, in protest to the world arsmst Lous Napoleon s hetrayal of the Republic and usurpation of monarchy In his democratic sympathes he was indignant at the misery that infests the slums of great cities, and the great cost in social injustice, labor and sweat and heartbreak on which the superstructure of civilization is built. (Misérable is both a noun and an adjective, meaning "wretched," "unfortunate"; and the untranslatable title of Hugo's novel means something like "The Dregs of Society.")

'Les Misérables' is a study of French society in the first years after 1830, when Hugo was young. In the character of Marius, Hugo gives a picture of his own early manhood. The hero, Jean Valjean, is a convict

on whom 19 years of prison life have branded an indelible scar. He steals the cherished silverplate of a bencfactor; he seizes a small coin from a little chimney sweep. Repenting, he is transformed into a man of honesty and honor. Years later, he learns that an innocent man is accused of the theft that he thought he had atoned for by years of charity. After an agony of inner struggle, he gives himself up and is returned to a convict ship. He escapes, adopts a little seven-yearold waif, Cosette, and gives her a place in the sunshine. She and Marius later fall in love, and Jean Valjean faces the bitter realization that he must relinquish her. Out of devotion to her he risks his life to save Marius, who has been wounded in the revolution of 1832. In one of the most unforgettable scenes of the book, he carries the almost lifeless form of Marius through the underground sewers of Paris. Having assured happiness to these children of his choice, he dies neglected and broken-hearted.

Around this structure of plot, Hugo has created a work of immense richness and power that is less a novel than a prose epic. It has been called "a vast invention, beautiful, incredible, sublime, absurd, absorbing in its interest, a nightmare in its tedium." In any event, 'Les Misérables' was once voted by popular referendum the greatest novel in the world.

HUGUENOTS (hū'gĕ-nŏts). This name, given in the time of the Reformation to the French Protestants, was probably a corruption of the German word Eidgenossen (confederates).

It was first applied to the Swiss Protestants, with whom the French Protestants had much in common. In their struggles for religious freedom the Huguenots were driven to become a political party, and even a "state within the state," headed by some of the greatest French nobles.

By the middle of the 16th century their numbers and influence had aroused the fears of the Catholic party and the powerful family of Guise. Eight separate religious wars followed. The first war began with an attack by the Duke of Guise and his followers on a congregation of Huguenots assembled for worship in a barn. The peace which concluded the third war was broken by the massacre of St. Bartholomew, the most dreadful of the many crimes that marked this era of religious and civil warfare. (See Coligny.)



Here the little waif Cosette stands spellbound by sight of a lovely doll, while knowing only too well that such playthings were not for her. From such contrasts of beauty and misery, brought to life by masterly telling, Victor Hngo bnift his nove 'Les Misérables', a gripping story of life, love, and sorrow among the poor of France.

The Huguenot wars ended in 1598 when Henry IV—who was formerly a Huguenot, but who later conformed to the Catholic church—issued the Edict of Nantes. The edict gave the French Protestants political rights, religious freedom, and the possession of certain fortified towns (see Henry, Kings of France).





Their fortresses were lost with the capture of La Rochelle in 1625 (e e Richelieu Cardinal) Although the Edict of Nantes was in other respects confirmed the Huguenots were still harassed and persecuted from time to time

When Lou s XIV revoked the Edict of Nantes in 1680 all protection of lax was with lrawn from the Huguenots Although they were forb dden to leave France hundreds of thousands suc teeded in escaping They carried French arts manufactures and culture to England Germany the Nether lands and the American Colonies especially South Carolina New York and Pennsylvania France was thereby the poorer like Spain after the expuls on of the Moors

The famous opera Les Huguenots by Meyerbeer uses the trame t mes of the Huguenot persecutions for its background. The hero and the herome are killed in the massacre of St. Bartholomew (see Opera) HUMANE SOCIETIES In April of each year Be hand to An mals Week is observed the nation over chools parent-teacher organizations women s clubs and other soc eties ion with humane societies to think about the protect on of animals

Organized interest in protecting naimals began in England more than a century ago In 1822 Richard Martin an Irish member of Parliament brought about the passage of an act to prevent the cruel and mproper treatment of cattle Two years later a Society for the Prevention of Cruelty to Animals was formed to enforce the Martin act and to help all other animals subject to abuse After 1835 when Queen Victoria became a patron of the society its influence grew and soc et es were formed in many parts of the world

Henry Bergh an Amer can who became interested in the work of the British society while in London



per p ctures Humane Society workers are helping a horse which is too and. Since horses usually are tstriffed and res at being helped the an aud with ropes (eff). Then it is b indicided and taken in a truck (r ght) neat elecante e. In the lower p cture a class of Boy Scouts is learning bound with ropes (eit) Then it is b indfolded and taken in a truck atment elsewhere in the lower p curre a class of Boy Scouts is: first a dor dogs. To prevent the dog from biting its mouth is ned.

founded the first Society for the Prevention of Cruelty to Animals in the United States It was incorporated m 1866 by the legislature of the state of New York In 1874 Bergh founded the New York Soc etv for

the Prevention of Cruelty to Children This is said to be the first organized movement for the protection of children in the United States A great step toward unifying the work was taken in 1877 with the format on of a nat onal organizat on the American Humane Association which has for its object the protect on of both children and animals. It succeeded in doing anay w th such abuses to cattle in shipment as over crowding and lack of food and water

Defenders of Furbearers was organized in Washing ton D C m 1946 to eliminate use of the cruel steel trap, to develop pamless methods of captur mg fur bearing animals and to encourage the public

to purchase ranch raised instead of wild animal furs Humane societies promote laws to protect animals provide animal shelters and ho pitals and conduct educational campa gns in the care of peta



Here is mother rubythroat and her two babies in a nest in a pitch pine tree.

UMMINGBIRD. Like a splendid jewel, the tiny hummingbird flashes across a garden at a speed the human vision is unable to follow. Exquisite in form and brilliant in its changeable coloring, this mite is the masterpiece of the whole bird family, though it is usually less than four inches long. This tiniest

of birds does not sing, but squeaks like a mouse. Hummingbirds belong to the New World exclusively. There are about 750 species and subspecies, ranging from Alaska to Patagonia. The Andean regions of Colombia and Ecuador have the greatest variety of species. All have long slender bills-sometimes longer than the head, neck, and body together-tiny bodies, brilliant plumage, and marvelously developed wing

This extraordinary wing power is the result of the hummingbird's feeding habits. It feeds on the minute insects which loiter in the depths of flowers too small to support the weight even of so tiny a creature as the hummingbird. So it has developed very strong wings, which sustain it above the blossom, vibrating so rapidly that they make a humming sound and the eye sees them only as a filmy haze. To enable it to reach far into the deep flower-throats it has developed its long beak and its long tapering doubletubed tongue. This tongue can be instantly extended to an extraordinary length to seize insects in flowers

or under the bark of trees. The common idea that the hummingbird lives exclusively on the nectar of flowers is a mistake. With the insects it of course gets some of the nectar, but it is the insects, not the nectar, that the bird is after. Like the bees, the hummingbirds are very useful in the cross-fertilization of plants, for bits of pollen cling to their bodies and are carried from flower to flower.

The nest of a hummingbird is a tiny cup-shaped affair, such as a fairy might build, and it is made of quite fairy-like material, plant-down, stuccoed with moss and spiderwebs. The eggs are pure white and never more than two in number.

In that part of North America bounded by the Mississippi and the Atlantic, Florida and Labrador, only one species of hummingbird is found. But during the summer months that one, the rubythroat, is everywhere present. The male measures a trifle under three and one-fourth inches from the end of its bill to the tip of its tail, and the female is nearly four inches long. The upper feathers of the male are the

glistening green of an emcrald, with changeable amethyst lights over the wings and tail. The under feathers shade from pearl-gray into the darker upper feathers, and the throat is like a glowing ruby, with all its variations of color. The females are more soberly clad. (For illustration in colors see Birds.)

Yet for all his splendor, the little fellow is very friendly with his human neighbors and likes to perch about their gardens, calmly preening his feathers, quite unconscious of the delight afforded by the sight of such a performance. Despite its tininess, the hummingbird is a fierce little fighter and will even rout a hawk or crow that ventures too near its nest.

In the rubythroat and also some other species, the little buglike babies are fed with food the mother bird bas partially digested and which she pumps through her bill into the mouth of the fledgling.

Most of the rubythroats, from as far north as Alaska, winter in southern Mexico or Central America. After migrating to the Southern states, these tiny birds some autumn night launch out across the Gulf of Mexico, straight for their winter home 500 miles distant, and, incredible as it may seem, the trip is made without stop for food or rest.

West of the great plains of the United States, a number of other species of hummingbirds are found. Among them, California has the Anna's hummingbird, and one of the western species, the rufous hummingbird, is found as far north as Alaska.

Many of the species found in the tropical districts are even smaller and more remarkably clothed than the rubythroat, for in addition to the brilliant metallic plumage, they have various feather adornments. Of these the most remarkable are the "double-crested,"

SPEED CAMERA STOPS HUMMINGBIRDS' WINGS



This remarkable photograph was made by the high-speed stroboscopic camera invented by Prof. Harold E. Edgerton and his associates of Massachusetts Institute of Technology. Taken at 1/100,000 of a second, the picture arrests the motion of those tiny wings, which average 55 strokes a second.

with its growth of amber-like feathers over each eye, and the "tufted-neck," with a wonderful red crest and long green-spotted tufts of red feathers extending from either shoulder.

The hummingbird family is known as the Trochilidae. Scientific name of rubythroat, Archilochus colubris.

## The Days of CRECY, POITIERS, and AGINCOURT

#### A War that Rayaged Europe for More than a Century-What It was All About-The "Black Death" Pestilence that Stalked on Its Heels-

How Joan of Arc Drove Out the English

HUNDRED YEARS' WAR (1337 1453) On the side of a little hill near Creey in northern France, an English army under King Edward III Liy drawn up in three orderly divisions late one August day in 1346 On the plain below, outnumbering the English five to one, was a confused di orderly host of mounted French men at arms and hired Genoese erossbowmen on

tower of a windroll he inquired "Is my son dead, or hurt or felled to earth? 'No. sire said the messenger but he is overmatched and has need of aid' "Then replied the king return to them that sent you and say to them that they send no more to me, so long as my son is alive and also say to them that they suffer him this day to win his spurs, for I will

that this day a work be his, and the honor thereof ' As darkness fell

the remnants of the French army were fleeing in confusion. but the English lines remained firm in their position on the hill Thus the English army won at Crecy the first greet land battle in

the long Hundred Years' War with The war had

started in 1337, and it did not finally close until 1453 The causes of the conflict were to be found in the constant clashes growing out of the English holding of Guienne as a ficf

from the French erown, in the aid given by the French to the Boots in their wars against the English, and finally in the interference of Philip of France and his vassal, the Count of Flanders, with the profitable wool trade of English merchants with the Flemish cities. In addition there was the claum that Edward III himself was rightfully king of France because his mother was a sister of the late French king, while Philip VI was only a cousin, but the French assembly had decided

by a woman por by one who claumed through a woman (miscalled the 'Salic law') The conflict was really a series of wars, truces, and peates lasting through the reigns of five English kings from Edward III to Henry V, and of five French kings from Philip VI to Charles VII At the time of the battle of Greey the English had already

that the throne of France could neither be inherited

foot, under the French king, Philip VI

Suddenly the Genoese advanced to the attack But they were tired with a long day s march, and their crossbow strings were loosened by the wetting reterved in a terrific thunder shower Although they "shot flercely with their crossbows ' they were no match for the more rapid shooting of the English longbowmea whose shafts fell so thick that

it seemed snow" liben the Genoese raw the arrows fall ing thick among them they cest down their bows and fied At this King Philip flew into a rage and

med out, "Slav these rascals for they will trouble us without reason! Whereupon his men at-arms dished in among the Genoese and slew a great number of them And ever still," says the chronicler Frossart "the

Englishmen shot where they saw the thickest press The sharp arrows pierced the knights and their horses, and many fell, both horse and man And when they were down they could not rise again the press was so thick that one overthrew snother '

In one place the French managed to reach a band of dismounted English knights commanded by the Black Prince, the 16-year-old son of Edward III In bate a messenger was dispatched by the knights tsking aid but when their request was made known to the king, where he watched the battle from the



won command of the English Channel by a spectacular naval victory at Sluys; and after Crécy, the town of Calais, the door into France, surrendered to them on

Sept. 28, 1347, after a year's siege.

For almost ten years after that the fighting lagged. This was due in part to a great pestilence, called the "Black Death," which swept over Europe and carried off more than a third of the population (see Black Death).

Not until 1355 was the struggle between the two countries renewed. The English now carried the conflict into southern France instead of confining it to the northern section as before. At Poitiers (1356) the Black Prince with a small army of Englishmen was confronted by an overwhelming French force. In vain the Prince offered to surrender his spoils and his prisoners and to promise not to fight for seven years if he might be allowed a safe retreat. This offer was rejected, so certain did the French feel of victory.

The Longbows Win the Day at Poitiers

The Black Prince arranged his troops on a little plateau protected at the flanks by a hedge and by rough and marshy ground. The brave but inefficient French King John threw away his advantage of superior numbers by ordering his knights, weighted down with their armor, to dismount and advance on foot against the hail of English arrows. "There was a sore fight that day," says the chronicler, "and many a great stroke given and received." One after another the three divisions of the French army were thrown into confusion. King John and his youngest son, refusing to flee, were taken captive by the English. Again the victory was due to the new English weapon—the "longbow," with its "cloth-yard shaft"—and to the trained skill of the English archers.

The horrors of a peasants' revolt and civil strife were now added to the miseries of France. A treaty with England was finally concluded at Bretigny in 1360, by which King John was to pay a large money ransom, and Edward III was to have Guienne, Crécy, and Calais in full sovereignty. In return Edward III

renounced all claim to the French crown.

But in 1369 the new king of France, Charles V, physically weak but intellectually strong, found an excuse for breaking the treaty and renewing the war. Aided by the able Breton general, Bertrand du Guesclin, he organized an army of professional soldiers instead of the medieval knights, and by cautious maneuvering brought one place after another into his hands. Only Calais in the north and Bordeaux in the south remained to the English at the time of Charles' death in 1380.

Victory of the English at Agincourt

For nearly a generation the war then languished, due to factional strife for power in both England and France. Soon after the accession of Henry V, the hero king of England, it began again. At Agincourt, near Crécy, a small English force was again confronted in 1415 by a large French army. The French, it seemed, had learned nothing from the

disasters of Crécy and Poitiers or from the exploits of Charles V and Du Guesclin. As in the two former great battles, their forces consisted chiefly of dismounted knights weighted down with heavy armor. Again they were packed close together in a narrow newly plowed field between two woods in which they sank almost to their knees. Shakespeare makes Henry V say, the night before the battle, that he "wished not for a single man more" to share the glory. A third great English victory, equal to those of Crécy and Poitiers, was the result.

By the Treaty of Troyes (1420) the defeated and disunited French agreed that Henry V should marry Princess Katherine, the daughter of Charles VI of France; that during the life of this insane king. Henry should act as regent; and after Charles' death Henry should reign as king of France as well as England.

Henry V did not live to wear the French crown for he died seven weeks before Charles passed away (1422). The death of these two monarchs left the claim to both thrones to Henry VI, the nine-month-

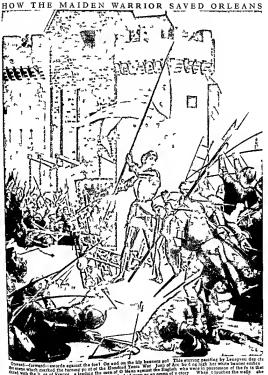
old son of Henry V and Queen Katherine.

The English claims in France, however, were disputed by the disinherited dauphin of France, later Charles VII, who refused to accept the Treaty of Troyes. For a time he was too weak to be feared and at the end of seven years it seemed that Orleans, his last considerable stronghold, would surely fall to the English.

The Wonderful Maid of Orleans

Just at this darkest moment in the fortunes of France, a new force appeared in the person of Joan of Arc, the Maid of Orleans (see Joan of Arc). Inspired by her patriotism the French forced the English to raise the siege of Orleans. Victory followed victory in rapid succession, until finally Joan led the dauphin through a hostile country to be crowned at Reims as King Charles VII. Even after Joan's capture and execution by the English and Burgundians her spirit seemed to inspire the French and to wake in them a new national sentiment. Little by little they drove the English back. Finally the war ended in 1453 with only Calais remaining in English hands.

Instead of winning the French throne for the English king, the Hundred Years' War had lost for him the last of those continental possessions which had once been held by Henry II. The French king no longer numbered a powerful rival monarch among his vassals, and soon established an almost absolute power in his kingdom. He enjoyed a permanent revenue and was supported by a standing army equipped with modern artillery-for cannon had come into use either at or since the battle of Crécy. In addition the hundred years' conflict to expel the foreigner from their soil had developed in French bosoms the root of that intense patriotism which today characterizes France. But against these gains for France must be balanced fearful losses inflicted upon its land and people, the check to population, and the brutalization of long-continued warfare.



Oward—forward—swords against the fost Ou and on the kly bennest as the seens which marked the turning point of the Hundrid Years Way Jose ford with the less of France a seedure the mark observed upon as sao on the seedure the mark observed upon as sao on the seedure the marked the city of Or fears Johns a standard way. The English we odr ve had seed as the seedure of the seedure usen as an emen of v ctory When t touches the wells useh we e dr ven from the forts and Origans was again free

# The Broad HUNGARIAN PLAIN and Its PEOPLE

HUNGARY (hũng'gà-rì). Before the first World War Hungary shared with Austria the rule of the great empire of Austria-Hungary. This war eost Hungary three fourths of its territory. In the second World War Hungary again went down to defcat with Germany. In 1945 the Russian army moved in, and Hungary became a satellite of Russia. In 1949 the name was changed to the Hungarian People's Republic.

The Land and the People

The plain of Hungary is roughly oval in shape. It was once an inland sea. On the north it is ringed by the great arc of the Carpathian Mountains; on the west it reaches to the Austrian Alps. The Danubc River enters it at the northwest corner and flows, first east, then south, down through the center of the country. A tributary, the Tisza, crosses eastern Hungary from north to south. Between these two rivers spreads a great flat basin known as the Alföld, or plain. A smaller plain, the Little Alfold, lies in the northwest corner, edged on the south by the highlands of the Bakony Forest. South of Bakony lies shallow Lake Balaton, the playground of Hungary. The Drava, another Danube tributary, forms part of the southwest boundary. The soil almost everywhere is rich and black.

Winters are very cold, summers hot and sometimes so dry that the desert mirage can be seen. Only in the Bakony Forest is there an extensive wooded area. The plains are bare of trees except for feathery American locusts, planted in straight lines along village streets, and willows and poplars bordering the rivers. The rain does not run off in small streams but collects in lakes and ponds, soaks into the soil, and joins the rivers underground. Wherever a well is sunk, it will find water.

The people of these broad plains are unlike those of any other European nation. They call themselves Magyars and their land Magyarorszag. Their ancestors came out of Central Asia a thousand years ago. Through intermarriage with Slavs and Germans they lost their Mongolian features. Yet they have remained a distinct people, clinging proudly to their traditions and their strange tongue. The only people in Europe whose speech at all resembles Magyar are the Finns and Esthonians. They, like the Magyars, are Finno-Ugrics.

Agriculture and Industry under Communism

Hungary used to be called the granary of Europe. Its rich fields produced a surplus of wheat, meat, and butter. The people sold food to western Europe and bought manufactured goods. Hungary is now behind the Communist Iron Curtain and its trade with the West is cut off. Surplus food goes to the army and the security police. In the cities meat has become a rarity and even bread has to be rationed.

Before the Communist régime, few peasants owned land. They worked for wages on large estates and lived in farm villages. Their houses were one story, long and narrow, with smooth, whitewashed walls. They raised wheat and sugar for market and corn and turnips to fatten pigs and cattle. For their own tables they grew rye, potatoes, vegetables, and grapes for wine.

The Communists dispossessed the rich landowners and divided the land among the peasants. The peasants welcomed the change; but they were soon asked to give up their small holdings and work on state-owned collective farms. They resisted, and production fell so low that the government was forced to slow down its program. But it did not abandon its goal.

Trade and all large businesses were nationalized, and plans were drawn up for heavy industry—a three-year plan in 1947 and a five-year plan in 1950. When production fell short of the goals, the government decreased wages and at the same time demanded greater output from each worker. In 1951 about 30,000 people who were considered "undesirable" were taken from their homes and sent to concentration and forced-labor camps.

Except for mining, industries are still based mainly on agriculture. Budapest, the capital, is the only large manufacturing city (see Budapest). Coal is mined at Pées. Deposits of bauxite yield aluminum, and some oil, manganese, and iron are obtained.

Churches and Schools

In 1941 about 65 per cent of the people belonged to the Roman Catholic Church. It was strongest in the west. In the east were Calvinists, Lutherans, Greek Orthodox, and Mohammedans. The government seized Catholic church lands and closed Catholic orders. In 1948 it imprisoned Cardinal Mindszenty, and in 1951 Archbishop Joseph Groesz.

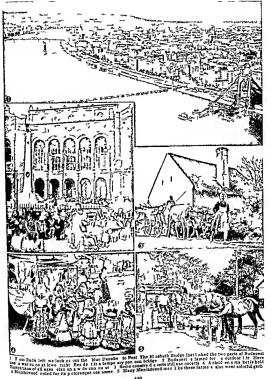
Practically all education is now in "general schools" which are closely supervised by Communists. Education is compulsory for children of 6 to 14. The chief institutions of higher learning, except for the University of Budapest, are trade and technical colleges. All text books must express Communist views.

How the Scourge of Europe Became Its Shield

About A.D. 895 the Magyars rode through the Iron Gate of the Danube Valley with their herds of long-horned cattle and pitched their tents on the grassy plains. For half a century they ranged far and wide, like their predecessors the Huns, carrying off loot and slaves to their homes. Finally Otto the Great assembled a force in Bavaria and subdued them in the battle of Lechfeld (955). The Magyars then settled down and began to till the soil.

Surrounded by hostile peoples, it seemed unlikely that this small outpost of Asia could survive in the heart of Europe. It was saved from extinction by its first great king, Stephen (977?-1038), who welded his unruly pagan tribes into a nation. He appealed to the Church of Rome for protection and set up bishoprics and monasteries to Christianizc his subjects. The pope gave him a crown for his services. After his death he was canonized. The Holy Crown of St. Stephen was stolen by the Nazis during the second World War and recovered by the United States Army.

#### IN THE ANCIENT LAND OF THE MAGYARS



In the 13th century Mongol hordes followed in the footsteps of the Magyars, ravaged their lands, then disappeared into Asia (see Mongols). In the 14th century Hungary rose to a dominant position in the northern Balkans, and in the 15th century its king Matthias Corvinus extended his rule north of the Carpathians. But in the midst of this Golden Age, Hun-

rebellion was Louis Kossuth, whose name is revered in Hungary as a symbol of liberty. Through his efforts serfdom was at last abolished. But the land still remained in the hands of a large aristocracy, and the peasants continued to live under feudal conditions.

In 1867 Austria made peace with Hungary by allowing it an equal partnership in a Dual Monarchy (see

Austria-Hungary). This arrangement failed to satisfy the Slavic peoples who lived on Hungary's borders. When the first World War shattered Austria-Hungary, they broke away, leaving Hungary with only a third of its former territory. Slovakia in the north went to Czechoslovakia, Transylvania in the east to Rumania, and the Slav lands in the south to Yugoslavia.

A Monarchy without a King In 1918 Hungary proclaimed itself a republic. In 1919 Bela Kun, a young Communist war veteran, seized control and pro-

CONTRASTING SCENES IN HUNGARY



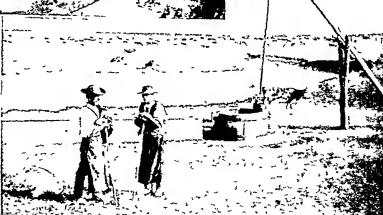
gary became involved in a long and exhausting struggle against the Turks. Defeated at Nicopolus in 1396, the Magyars rose again under their great leader John Hunyady and in 1456 pushed the Turks back to Constantinople. At last, in 1526, in the famous battle of Mohacs, the Hungarian army was annihilated and its king perished.

The Hungarian diet now elected Ferdmand I, archduke of Austria, to the throne. But the area left to him was only a small half-moon in the northwest corner. A Turkish pasha established himself in Buda and ruled the richest part of the country. After an exhaust-

ing 20-year war of liberation at the end of the 17th century, Hungary finally threw off the oppressive Turkish yoke. But it was still not free—merely an eastern province of the powerful Austrian empire.

Partner in a Great Empire

Revolts against Austrian rule culminated in the great rebellion of 1848-49, which was crushed by the joint efforts of Austria and Russia. The leader of the



Splendid parks, tree-shaded boulevards, and vistas of architectural charm made Budapest, Hungary's capital, one of the beauty spots of Europe. In this view through Liberty Square (above) we see the Parliament Building in the background. This area in Buda, on the high western bank of the Danube River, was shattered when Budapest was besieged by the Russians in 1945. Below we see a typical rural scene, with herders guarding cattle in the communal pasture. Should the pond where the cattle drink dry up, the well sweep stands ready to fill the watering trough from the shallow well.

claimed Hungary a Soviet republic of Russia. But he had scant support and his Communist rule collapsed when Rumania invaded. Admiral Nicholas Horthy, Conservative, then won power. Although Hungary had no king, Horthy "restored" the monarchy and established himself as regent, guardian of the Holy Crown.

Hungary now tried to regain its lands. It looked first to Italy for aid, but as Germany rose to power

Hungary turned increasingly toward the Naze. In 1939 it signed the anti-Commtern part. Hitter rewarded it with evitern Czecho-lovakia, then in 1940 with a slice of Rumania and in 1941 a str p of Yugo slava. In all Hungary nearly doubled its area.

on June 26 1941 Germany forced Hungary to each the second Word War Hungary has an unsuling off and suffere I duge losses fighting ago act Russa sha Bracissan army draw near un 1944 Hungary bad for peace but was occupant to Germany. Hungary a country de suffered little data ago me the sex it is resulted and World War Second.) Hungary as dan World War Second.) Hungary as dan World War Second.) Hungary as each world was suffered actions change. (See all World War Second) and the second control of the sum of the Russal to the sum of the Russal to the filmgaran Peoples Republic. In 1943 the pum ber of members in parliment was cut to only 208 presumably for get a centralized rezume Mac Reseau a new collections in parliment was cut to only 208 presumably for get a centralized rezume Mac Reseau a new collections.

The peace treaty of 1947 nullfied Hungary s terr toral gains. Area, 35,912 square miles. Papulation

(1949 census) 9 204 799

HUNS A writer of the early Vaddle Ages pretured the savage smoderning Huns of h 5 me as 'men hitle in size but quick and active. They have lurgely on align ar animal fiesh which they merely savan by plung at between their own thighs and the backof their horses of homore-tick every man of the nation lives day and might. On horse-ticks he takes his meatand drugs and when might comes be learn forward on which they have been sometimed to the size of the size the neck of his horse and there fulls asleep. Other historians testify that the Huns often lived up to the fearsome picture that this ancient writer painted of them.

In 374 AD the Huns crossed the Volga River and entered Europe for the first time from the r homes in Central Asia They conquered the Ostrogoths, and driving the Vragoths across the Danube occup ed the region north and west of the Black Sex. There they had for more than 70 years before they began their second and greater wave of invasion. In 451 under Att h the seourge of God they swept into Germans and crossed the Rhine into what is now France laying asste the country with fire and sword In a bloods battle near Chalons Attala was defeated by a combined army of Romans and Visigoths under Actius and forced to retreat. The next year the Huns descended into Italy devastating the country They would probably have taken Rome had it not been for the brasery of Pope Leo I In an interview ho so oversued the fiery Hun that Attila spared the city and authorea from Italy With the death of Attila in 453 the emp re of the Huns which included all the peoples from the Volgs to the river Rhine quickly fell to pieces The remnants of Att las following either went back to Asia or mipgle I with the peoples they had subdued. Their great leader lived on in German legend as Etzel (see Ail elungs Song of the) The Magyars allo several centuries later crossed the Carpathian Mountains and settled what is now Hun gars nere related to the Huns

### The Ancient SPORT of KILLING GAME

LIUNTING The practice of hunting for game began to say a mean of supplying food The Indians of Aurth America and other primative groups obtained much of the Food by kill ng bufful be set deer and saterfool. During poneer days the frontessmen show depended largely upon all amunils and bunds for their meat. Later as furning and stock rassing pread across the cont ment hunting cassed to be an important means of livelihood. Today it is pra bundy a good to the contract hunting cassed to be an important means of livelihood. Today it is pra bundy a good to the contract hunting cassed to be an important means of livelihood.

Through the years the number of brensed bastless has the interacted until now there are more than 13 ml on in the United States. The groung number of bustless once the thestened to who out the gains supply. Since the late 1930 s. however sound conservation practices have been keeping the populat on if many species of game at a fight level despite increased intelligence of the present of game at a fight level despite increased intelligence of the control of the contro

The four major types of hunting in the United States are—upland game waterfowl big game and post (varment) Upland game includes rabbits squirrels qu'il pheasants grouse and woodend. Geese

game you want for food never waste it

an I mountain sheep and goals Pest hunting may be coyotes in the West crows on the farm or wood chick (groundhog ) almost everywhere

and ducks are the favorite naterion! targets Big

game hunters stalk deer bear elk antelope moose

Rules of Safe Gun Handling
The chief freamss used by hunters are 22-caliber
rifes large caller rifes and shotguins (see Fire
arms) All these are devdly weapons and should not

be handled unless certain rules of gun safety are followed. Nice bas c rules are 1. Treat every gun ns if it were loaded

2 When entering an nutomobile home or camp

carry a gun with the action open or taken apart
3 Be sure the gun buriel is free of obstructions

- 4 Carry a gun so that the duect on of the muzzle
  - an be controlled even in falling 5. Be sure of the target before pulling the trigger
- 6 Never point a gun at anything except in shooting 7 Never leave a gun unattended without first un leading it
- 8 Never climb a tree or fence with a loaded gun 9 Never shoot at hard flat surfaces or the surface of mater

Hunting with a Rifle

The first firearm that most hunters learn to u e to the 2 cul ber rifle Tirs gun serves best for

shooting rabbits and squirrels. It is also a fine weapon to use on crows, woodchucks, and other animals that are hunted for sport or as pests and not primarily to eat. These rifles are most commonly made in four styles: single shot, pump, bolt action, and automatic. All can be used in the field or on a target range (see Ruflery).

For larger game, the most popular rifles are the 270, 30, and .375 calibers. The basic styles are: pump, bolt action, and automatic. These rifles are used chiefly for hunting bear, deer, elk. and other big game found in forested or mountainous country. Heavier caliber rifles are sometimes used for shooting elephants, rhinoceroses, and other big game hunted in Africa and elsewhere.

### Hunting with a Shotgun

Upland game and waterfowl are hunted with a shotgun. There are six types of such guns: single barrel, single shot; side-by-side double barrel; over-andunder double barrel; bolt action; pump; and automatic. There is also a choice of shotgun gauges ranging from the small .410 inch bore through the heavy 10-gauge guns. For most hunters, the 20-. 16-, or 12-gauge guns are best.

Selecting the proper choke and the correct barrel length is important. The choke means that certain barrels are constricted (tapered) at the front end with the amount of this constriction designated as choke. It varies from a true cylinder (which has no choke) to modified and full choke. The cylinder barrel tends to spread the shot pattern of the pellets. The more a barrel is choked, the smaller the shot pattern becomes. A full choke barrel makes the smallest pattern, holding the pellets closer together at any given distance. Mechanical choking devices permit the hunter to use a variety of chokes on a single barrel.

For quail and rabbits, where shooting is at close range and in brushy country, the cylinder choke is best. Usually, a barrel length of 26 inches serves well with this choke. For shooting pheasants, waterfowl, grouse, and other game at long ranges, the full choke barrel works more successfully, and barrel lengths of 28 or 30 inches are recommended. Actually, a longer barrel does not give a hunter much additional killing range, but it does make sighting easier.

A shotgun should feel comfortable to the shooter if accurate gunning is to result. The stock may be shortened or lengthened to fit the shooter's shoulder. Another important point is the weight of the gun. A hunter must be able to throw the gun quickly to his shoulder and swing it with the target fast and accurately.

### Other Types of Hunting

Some hunters find greater sport in killing game with a bow and arrow rather than with a firearm. If properly used, this weapon is as deadly as a rifle.

Much of the fun of hunting comes from just being in the fields or lowlands enjoying nature. Many hunters add to their pleasure by using a hunting dog. A well-trained dog can find game that would escape



Killing upland game birds requires quick and accurate shooting. Here a hunter is getting a grouse with a well-aimed shot.



Duck hunters must be patient as well as good shots. They often find a good hunting spot and then wait for a flock to appear.



In some states there is a prize, or bounty, offered for killing coyotes. This hunter is trailing a coyote with the help of two dogs.

#### HUNTING BIG GAME AT LONG RANGE



The Rocky Mountain region is one of the few places left in the United States where a variety of big game may be found draws a beed on two carsbou scurrying to get out of range

s hunter's eye Most dogs also make good retrievers of killed or crippled game (see Dogs) Laws Governing Hunting

The federal government and all state governments have passed laws to conserve the supply of game birds and animals. In general migratory game birds are protected by federal law other forms of game by state laws These regulatione prohibit the Lilling of game except during open scasons The exact dates of these hunting seasons vary from state to state and sometimes by zones within states Other regulations govern the method of taking game the amount of game that can be killed in one day and the amount of game that a hunter may have in

his possession All states issue hunting licenses which may be purchased for a fee Federal law requires the purthase of a migratory bird (duck) hunting stamp in addition to the state Leense

Obeying the Rules of Hunting Etiquette Every hunter can add to his own enjoyment and the pleasure of others by following the simple rules of

good hunting etiquette Some of these rules are l Never hunt on a farm without asking permission from the owner If possible, park your car in the

farmer a yard 2 Close farm gates after passing through An open gate may allow livestock to escape

3 Do not damage the crop by walking through a nenly planted field 4 Be careful not to damage fences in crossing

5 Respect all signs They were put up for a pur-

pose 6 If hunting with a dog that belongs to a com-

panion never try to give the dog commands. Let its master do this 7 Always give a companion the "breaks in shoot-

ing It is customary to alternate in shooting single birds 8 Never he a 'claimer " If another hunter shoots at the same bird give him the benefit of all doubt

and say he killed it 9 Offer to share your game with the farmer who gives permission to hunt on his land

10 Remember the rules of safe gun handling Careless and thoughtless gunners are not welcomed as

hunting companions HURON, LAKE The second largest of the Great Lakes Huron has an area of 23 010 square miles including Georgian Bay Its greatest length is 206 miles and its width 183 miles. Its shape is so irregular that a line from the head of Sagmaw Bay to the far shore of Georgian Bay is nearly as long as the like itself Its level and its depth are about the same as these of Lake Michigan, with which it connects through the Straits of Mackinae Its surface is 580 feet above sea level. Its greatest depth is 750 feet Huron's ports are of secondary importance However the lake is a great highway for ship traffic despite the mountainous waves which ' northeasters' drive upon its western shore Such waves make Saginaw Bay feared by mariners at the end of the season

The most heautiful scenery of all the Great Lakes is in Georgian Bay, a great arm of Huron, 120 miles long and 50 miles wide. It is separated from the lake to the north and east by the long island of Manitoulin. One of the most picturesque water voyages in

North America is a trip through the North Channel, between Manitoulin and the rocky bluffs of the Ontario mainland, and among the "Thirty Thousand Islands" that strew the northern half of the bay. Georgian Bay is one of the most popular vacation spots of the continent, and hundreds of cottages and hotels have been built on its islands to accommodate summer visitors.

The Trent Canal, between the southeast end of Georgian Bay and the Bay of Quinte, near the eastern end of Lake Ontario, was designed to provide a shorter water route for shippers hetween the St. Lawrence River and the Lake Superior-

Lake Michigan region. As it permits a draft of only six to eight feet, it is too shallow for large vessels

(see Canals).

Through the St. Clair River, Lake St. Clair, and the Detroit River, the waters of Lake Huron flow into Lake Erie. The passage between the lakes is continually dredged keeping open a channel of fixed depth. Huss, or Hus, John (1369?-1415). On the shore of Lake Constance in Germany, July 6, 1415, John Huss was burned at the stake as a heretic and his ashes thrown into the Rhine. He had died rather than recant his religious views and criticisms of the clergy. Like John Wycliffe, the English priest whose doctrines Huss largely followed, the frail determined Huss served as a forerunner of the great religious revolt called the Reformation (see Reformation; Wycliffe).

Huss was born of humble parents in the little Bohemian village of Husinec. He was christened Jan or John and was later called John of Husineç or, in shortened form, John Huss or Hus. In preparation for the priesthood in the Roman Catholic church—the only religion at that time in Western Europe-he entered the University of Prague. After graduation he lectured there on philosophy. For a time he was a rector of the university. He also supported the Bohemians' protest at the undue influence of Germans in the university. The protests led the German masters and scholars to secede in 1409 and found the rival University of Leipzig.

At the time of Huss, European scholars wrote in Latin, the universal language for learned men in all nations of Europe. Huss, however, also wrote his beliefs in his native Bohemian (Czech) tongue, and so became one of the founders of Bohemian as a literary language. His powerful sermons, preached in Bohemian, won the trust and affection of the people. and many hecame his devoted followers.

Early in his priestly days Huss had been attracted by the religious and philosophical writings of John

Wycliffe, who denounced irregularities among the clergy. As told in the article Reformation, evil practices had grown up among some of the clergy despite efforts of the church to root them out. Huss carried on Wycliffe's strong protests and was long supported by the

bishop of Prague. Huss's vigorous campaign, however, also won him many powerful enemies, especially in the church.

Huss did not follow all the heliefs of Wycliffe, who had been denounced as a heretie. For example, Huss did not reject the church's doctrine of transubstantiation. Nevertheless, when he opposed the burning of Wycliffe's hooks, he was charged with heresy and forbidden to preach or to teach.

This was the troubled time of the Great Schism in the church (1378-1417), caused by rival claims to the papacy. (For names of rival popes, see table in the Fact-Index, titled Popes of the Ro-

man Catholic Church.) When one of the popes, John XXIII, proclaimed a crusade against his rival, the King of Naples, and promised indulgences to volunteers, Huss attacked this procedure. His followers burned the pope's bull (papal decree). The church excommunicated him and laid an interdict on any place that would shelter him. Friendly noblemen defied the interdict and housed him while he turned to writing.

In 1415 the Council of Constance met to heal the Great Schism and to discuss reforms in the church. To justify his views, Huss got a safe-conduct to the Council from the Emperor Sigismund. At Constance, Sigismund ignored his safe-conduct pledge and had Huss arrested as an evcommunicated heretic and thrown into prison. He refused to recant his teachings, declaring, "I am prepared to die in the truth of the Gospel which I taught and wrote." His views later greatly influenced Luther (see Luther).

Huss met his tragic death steadfastly, as did his disciple, Jerome of Prague, a year later. Rather than putting down hercsy, the death of Huss made his beliefs the national religion of Bohemia. To Bohemians, he became their "hero, martyr, and saint."

His death inspired the bitter, often savage Hussite Wars (1419-34). These were the struggles by Bohemians for national, religious, and social revolution. Time and again they threw back the combined forces which European nations sent forth as "crusades against Hussites and all heretics in Bohemia."

HUTCHINSON, ANNE (1591-1643). In colonial New England, the Puritan leaders demanded strict obedience to both ehureh and eivil laws. Anne Hutchinson was one of the first to challenge their absolute authority in religious matters. Her protest helped to establish the American principle that each man can worship in his own faith. For her rebellious act, Anne Hutchinson was banished from the Massachusetts Bay Colony. She spent her last years in New York. Her life ended in tragedy. She and her children were massacred by Indians.



This Bohemian priest-critic had great influence on Luther and the Reformation

Anne Marbury Hutchinson was born in Allori England. She was baptured on July 20 1501. Her father Francis Marbury was an English minister. Twice he was impraosed for his fearless preaching against the established Church of England. Although Anne had no formal education she kearned much by Listening to her father and his fineds talk of religion and government. When Anne was 14 her father was appointed to Sk. Martin e Clurich in London.

At 21 Anne married William Hutth no ne her childrion sweetheast and they riturned to Alford to live They had 14 far Anne Hutchinson was active in religious interests She often made the 24-nule punney to Boston England to hear J In 1633 Cotton was forced to heave England to hear J in 1633 Cotton was forced to heave England to the contract of the con

Son Anne Hutchinson held weekly prayer meetings for the women of the col ony At these meetings she often crit care! the preaching of the clerry Anne held eved that the Lord dwelt within each individall She felt that faith alone would wan sal val on This was opposed to the teachings of the Purthal faithers (see Massachusetts) By 1638 Anne had made many converts Among the most individual weekly the m law Reverend John Wheelwright and they young governor Henry Vane

John Cotton also supported her at first but he later publicly renounced her teachings With Governor Vane a convert the other magis-

trates and clergy feared evel disobedence and trade to regam control of the government. When Vane returned to England in 1633 they obtained the govertoring for John Winthrop. At once he bonnieds. When Vane to the Control of the Consided in November 1637 Date to the Latt. Shewar per

united to spend the water in near by Roobury Mass. Twee dumpt the water Cotton and other cherry near truck to get Anne to deny her beliefs. When also ridued she was formally economismates of roun the church. With her fam by Anne moved to Aquadneck. 31 in the spring of 1638. There with fre reds she bounded a new colony and remained until her baseling the spring of 1638 that with the reds of indian smaller of the truck and death in 1612. Then she moved with the young or children to Felham Bay in New York. The truck was the carbon with the exception of one of the enter the state of the spring of 1634 and of Indiana measure. The 14th gold with the overgine of the spring of 1634 and 1634 and



biolog at brought the findings of science to the whole nation by lecturing and writing in language that

nation by lecturing and writing in language that all could understand. Today his essays and speeches are at il read for their clarity and ease in expressing complex ac cattlife facts and ideas.

Thomas Huxley son of a echoolmaster was born at Eahns, on May 4 1825 For a few years Thomas attended has father a school but then George Huxley stopped teaching and moved his family to Coventry This ended Thomas formal education for a time al though he continued to read widely Two brothers-in law were doctors and they excited the boy s interest m med cine At 16 he was apprenticed to one a Lon don physician In 1842 he entered London University The same year he and h s older brother won scholar sh ps to Charing Cross Hospital At the hospital Thomas gamed a wide knowledge of comparative anatomy He also discovered a layer of cells in the root sheath of the hair now called Huxley s layer After graduation from the university in 1845 Hux ley was appointed a surgeon in the British navy and served on H M.S Rattlesnake He made many valu-

ley was appointed a Market and the made many valuable studies of sea creatures during a goyage to the Torres Strata in 1846-47 One was On the Anatomy and Affinites of the Family of Medusae which was to

furnish a most important link in the theory of evolution. This was before the publication of Darwin's 'Origin of Species', but Huxley here gave the first hint of the now widely accepted theory that the growth of a highly developed creature from embryo to adult is a hurried retelling of the story of the evolution of that species.

Darwin said that Huxley was one of the three men in England whom he needed to convince of the theory of evolution in order to satisfy himself. So thorough and carnest a convert did Huxley become that his popular lectures and writings in defense of Darwin's theory have somewhat obscured his own original work

in biology and zoology.

From 1854 to 1885 he was professor of natural history in the Royal School of Mines, London, being the first great teacher of hiology by the lahoratory method. Toward the end of his life he gave much time to public work in general education, to improving legislation concerning the fisheries, and the like, for he helieved, in his own words, that he was "a man and a citizen before he was a philosopher."

Among Huxley's best-known writings are: 'Evidences as to Man's Place in Nature' (1863); 'Lay Sermons, Essays, and Reviews' (1872); 'The Crayfish: An Introduction to the Study of Zoology' (1880); 'Scientific Memoirs' (4 vols.,

1898-1902).

HWANG RIVER. Winding through the mountains and over the fertile plains of northern China flows the great and terrible Hwang Ho ("Yellow River"), the "Sorrow of China." In its keeping are the lives and the fortunes of millions of people, and like a capricious giant it deals out death or wealth by turns. For thousands of years, since the earliest dawn of Chinese history, the people have struggled with this giant, trying to curb his strength, and today they are no nearer conquering it than ever.

Through the first two-thirds of its course the river, which is the second in size in China, flows through mountains, falling rapidly. The soil of these mountains is a yellow earth which dissolves easily and is washed down in enormous quantities by the river, staining its waters the deep yellow from which it, and the Yellow Sea, get their names. But as the river leaves the mountains and starts across the flat plains it begins to deposit this sediment. By degrees the bed rises and the people huild emhankments to prevent the river from overflowing. As the bed rises the embankments must be raised too, until the stream is flowing many feet above the level of the surrounding country. As time goes on the situation becomes more and more dangerous; finally a breach occurs and the whole river pours over the country, carrying destruction and ruin with it. If the breach cannot be repaired the river leaves its old channel entirely, and finds a new exit to the sea along the line of least resistance. Many times it has thus changed its course, entering the sea through different mouths as much as 500 miles apart.

In 1851 the river made such a change, and since then it has flowed to the north instead of to the south of the rocky peninsula of Shantung. It took 15 years to repair the damage, and even then many changes remained. The southern valley from a well-watered fertile plain was left practically without water. The northern valley was also injured because the river deposited three feet of sand and mud over the fields. Later the northern valley gained greatly in fertility because of the new water supply. In 1887 another flood occurred which swept away whole villages, killing more than a million people and flooding 50,000 square miles of territory.

The Hwang Ho rises in the mountains of Tibet, not far from the headwaters of the Yangtze Kinng. It makes first a great sweep to northward, and then, having struck a high mountain range, turns due south for 500 miles. It then turns eastward towards the sea. Although it is the seeond river in China, it is too shallow in winter, and too swift in summer, to be navigable. Its total length is about 2,700 miles.

HYAGINTH. The ancient Greeks told this story of the origin of the beautiful and fragrant hyacinth. One day, said they, the god Apollo was playing a

GARDEN BEAUTY

The hyacinth, a striking garden favorite, blooms in early spring. The many blossoms, clustered about a single spike, may be white, pink, blue, or scarlet.

game of quoits with a young mortal, Hyacinthus, whom he dearly loved, when Zephyrus, the god of the west wind, passed by. Being jealous of Apollo the west wind blew the latter's quoit aside, and caused it to strike poor Hyaeinthus, inflicting a mortal wound. In a few moments Hyacinthus died in Apollo's arms. In his memory the grieving Apollo then caused these heautiful clustered blossoms to spring from the fallen drops of the youth's hlood. At all events we

know that the wild hyacinth was originally found in Greece and Asia Minor. It was by comparison an insignificant plant. Brought to western Europe in the 16th century, the hyacinth was extensively cultivated by Dutch horticulturists. They succeeded so well that the original blue and purple blossoms were varied to numerous shades of pink, rose, yellow, scarlet, and pure white, so that today we have a splendid selection from which to choose. The best bulbs are still grown in Holland, where gardening is a national industry.

The hyacinth proper belongs to the lily family. The water hyacinth (Eichornia speciosa), which occurs in American tropical and sub-tropical regions, is a

member of a different family Pontedervaceae It grows m such profus on and spreads so rapidly that many overs in the southern United States are choked with it and water traffic is impeded. Various methods of end est ng it have been tried. Army eng neers send out beats to cut out the jam of hyacinths as soon as it forms and the tangled mass is pushed into the current to be carried away. Lyperiments are being made with a parasite which attacks the leaves from beneath and in time kills them. Although it is almost a thout food value cattle are fond of it

The scientific name of the gar len hyac nth is Hyaanth is orientalis. The flowers are small bell-shaped tubes with 6 recurved segments borne in a crowded raceme on a stout scape stamens 6 in number. The leaves are narrow erect from the base and 8 to 12 mehes long The bulb produces long fibrous roots HYDERABAD In the center of the pen noula of Ind a lies Hyderabad a state about as large as Kan

ms Its population is largely Hindu Unt! 1948 when it was merged with India it was an independ ent princely state ruled by the \izam-sn d to be the world a nchest man. The Nizam a Moslem became the state s rajpramukh (princely governor) Hindus

replaced Moslems in the government Hydembad ie on a plateau about 1 200 feet above

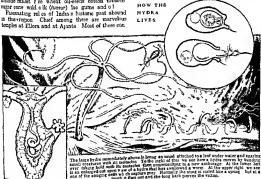
sea level. It is rich agriculturally and has great mineral wealth especially coal Agriculture is aided by arrestion including a huge tract which is watered by a dam two miles long across the Manira River Ra 1 made and manufactures are well developed. Products include millet rice wheat oil-seeds cotton tobacco

sist of caves cut from the solid rock and decorated with weirdly beautiful designs and figures made at the cost of enormous labor The Ka las at Ellora is looked upon as one of the wonders of the world The interior was carved out into great chambers and altars and has rehefs. On the outs de the rockbound. h II which formed its roof was chipped off and fash soned delicately into an exterior of graceful and intricate design. Today the temple looks as if it had been built up stone by stone until a closer inspection shows that all the thousands of rich details are part of one great carved rock

The city of Hyderabad capital of the Nizam s state is the fourth largest city in India. It has a population of I 085 722 It must not be confused with a smaller erts of the same name in Sind Pakistan

Hyderabad became independent during the 18th century when the Mogul Empire declined Its Nizam sumed a treaty with the Br tish in 1766 Hyderabad tred to keep its tes with Britain after the Indian Empire was dissolved (Aug. 15, 1947). It refused to iom the new India In 1948 the Indian army moved m and after five days fighting the Nizam's forces surrendered Area 8º 168 square miles population (1951 census ) 18 655 108

HYDRA Gather in a jar some of the water plants and stones from a stagnant pond and empty them into a glass bowl filled with clean pond water Before tong you will probably find attached to the glass where you can eee them the tiny fresh water creatures called hydras They are named after the many headed



The size of a common hydra may be judged here by comparison with the finger,

monster of Greek mythology (see Hercules). To the small animals on which they prey, these pond hydras are monsters too. Examine one with a magnifying glass. You will find it half as long as a common pin. The larger end is sticky, to attach it to objects in the quiet water of ponds and streams. The free end of the hydra is its mouth, capable of opening wide and surrounded by a circle of threadlike tentacles. Stinging cells in the tentacles poison and paralyze tiny crustaceans, worms, and other small creatures which touch them. Then the tentacles sweep the prey into the hydra's mouth.

The hydra is among the oldest and simplest of the many-celled animals (see Cell). It is closely related to the jellyfishes, sea anemones, and corals, which have bodies built on the same plan. The body structure is simple, but contains the essential elements

of the more complex forms of animal life. It has two layers of cells—an outer layer for protection and an inner one to perform the digestive operations. The bases of the cells are drawn out into long muscle fibers; in the way these fibers act we see them as the forerunners of our own muscular system. A network of nerve cells extending throughout the animal transmits nervous impulses picked up by the sensory cells to the muscle cells, which contract, or to the gland cells, which secrete.

Young hydras develop from buds on the sides of older ones, and also from eggs. If a hydra is injured, its lost parts are quickly restored, or "regenerated." If it is cut into

pieces, each piece will soon form a complete hydra. The few species of hydra, mostly world-wide but seldom abundant, are almost the only fresh-water representatives of their great branch of the animal kingdom (the Coelenterata). Two of the more common species of hydra are the brownish Hydra fusca, and the green Hydra viridis.

HYDRANGEA (hī-drān'gē-à). One of our showiest flowering bushes is the hydrangea, with its huge globular masses of little flowers. These flowers are peculiar, because the ones we see on the outside of the clusters are not complete. They are sterile, without parts for bearing pollen or seed; but their showiness attracts pollen-bearing insects from afar, and the insects leave pollen in the small, fertile flowers inside the clusters.

The hydrangeas form a numerous group of about 35 known species. They are native in regions of mild to semi-tropical climate in North and South America, Japan, China, and the mountains of India. A few species are hardy enough to survive the winter in the northern United States, and these are favored as lawn shrubs. Other kinds, especially dwarf varieties, are grown, or at least started, as potted plants in greenhouses. They may be planted outdoors in summer. The flowers are usually pinkish or white; but in some

species, a blue tinge can be imparted by adding iron or alum to the soil around the roots.

New plants are usually grown from suckers or cuttings of stems before the wood is fully ripe. Lawn shrubs should be sharply pruned in the fall or spring to force the next growth into flowers instead of stems. All hydrangeas require a rich soil or a supply of manure, ample water, and plenty of sun.

The name hydrangea comes from the Greek hydor, "water," and angeion, "pail." It refers to the shape of the seed pod. Hydrangeas belong to the saxifrage family. Scientific name of panicle hydrangea, Hydrangea paniculata; of snow-hill hydrangea, Hydrangea arborescens grandisora; of common dwarf plant, Hydrangea macrophylla otaksa.

closely related corals, which he body structial clements the SIG IS A HYDRA? AGHINERY. Click-chug! Click-chug! In the green stillness of the wilderness the staccato beat of unseen machinery is a strangely foreign sound. Presently we come upon the source—thow BIG IS A HYDRA? a little hydraulic ram less than two

a little hydraulic ram less than two feet high industriously pumping water to some unseen cottage on the heights above.

Let us see how it works. From a spring basin some 12 feet above the ram, an iron supply pipe brings the water to the ram at our feet. At first the water flows out through a waste valve and is carried off; but presently the increasing force of the water pushing up against the valve closes it, and it clicks shut. The column of water is instantly arrested, just as when we close a faucet. The recoil hurls the water

which points to the animal.

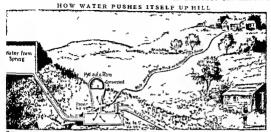
The largest have bodies
not quite an inch long. against an inner valve, opens it, and as the water rushes in, the air in the rounded chamber above is compressed. With the recoil of the water the pressure on the waste valve is lessened, the valve drops open, again providing an outlet for the water, which now turns in that direction. The compressed air cushion in the air chamber expands, closing the valve to the supply pipe, and forcing a small amount of water into the delivery pipe, which leads up to the house on the hill. But as soon as the downward rush of water is resumed, it closes the waste valve again, and brings on another hammer-like blow at the air chamber valve. As the process is repeated, over and over, the water is pumped steadily to a height much greater than its source, with no other force than the energy developed by the fall of the water itself. With a plentiful flow of water and a fall of from 1½ to 10 feet, a water

of the ram mechanism.

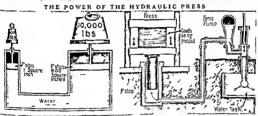
The recoil of the water can also be made to drive the sliding piston of a pump attached to the body of the ram, the piston lifting and pumping water through ordinary pump valves. With this arrangement a ram working with muddy water may be used to raise clear spring water.

supply can be lifted as much as 250 feet by means

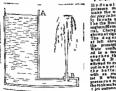
The hydraulic ram is only one of many machines operated with water power. These machines are possible because liquids are, for all practical pur-



ne ted the surprised the access the surprise properties of the surprised test of the sur



the searchow a Aydraulic p can gets in adoptions power. The small paraches a soften equal to have such a rath. It withen to the close of the close of the presume of the products a bodd. When the presume a start of serve to this paragrap that we have a bodd. When the presume a start of serve to this paragrap that we have a bodd with the close a power and the right above how the content of the products it is a present that presume the content of the presume the presume that presume the presume that the right above how the







poses, not compressible, and pressure exerted on any part of liquid in a closed vessel will be transmitted equally to all parts of the liquid. This principle was discovered by Pascal, the great French thinker who lived in the 17th century.

One of these machines, the hydraulie press, is so powerful that a man, working an ordinary pump handle, can lift hundreds of tons of weight with it. It seems that this would be possible only with very complicated machinery, but as a matter of fact the hydraulic press is very simply constructed. We have a tank containing two pistons, one much smaller than the other. If the smaller piston is one inch square, and the other 30 inches square, and we exert a pressure on the smaller piston of 100 pounds, the larger piston will hold up a weight of 100 pounds to each square inch of its surface -30 x 30 x 100, or 90,000 pounds. If the small piston is a pump that lets in more water with each upstroke, the large piston is slowly but surely raised, everting its enormous pressure.

Uses of the Hydraulic Press Before more rapid machinery was invented the hydraulic press was generally used for pressing oil from cottonseeds, for punching holes in steel plates, and for pressure in baling hay, paper, or cotton. Lead and tin pipes are sometimes made with the hydraulic press. These metals become plastic under tremendous pressure and flow out of the prepared orifices in the same way that macaroni is forced from the machine

in which it is made by moderate pressure on the dough. In hydraulic engines water under pressure pushes back the piston head until a sliding valve is opened by which it flows out. These engines are slow, and have been largely replaced by electric motors, although they are still occasionally used for hydraulie drive elevators or for pumping air for pipe organs. Turbines and water wheels are other forms of powerful machinery operated by water power, and used for many purposes (see Turbine).

"Hydraulies" (from the Greek hydor, "water" and aulos, "pipe") is the name which we give to the science which treats of the flow of water or other liquids in motion. The designing of dams, aqueducts, canals, and pipe lines is an important application of this science (see Water; Water Power; Water Supply).

HYDROCARBONS. Almost the entire bulk of living substances consists of only four chemical elementscarbon, hydrogen, oxygen, and nitrogen. Many substances contain only carbon and hydrogen. These compounds are ealled hydrocarbons.

Hydrocarbons have as their core a chain or group of carbon atoms. To form the core, each carbon atom forms four bonds or links with other atoms. The simplest example of all is found in methane, or marsh gas. In methane, one carbon atom exerts a combining power (valence) of four to hold four hy-Н drogen atoms, as shown at the right.

Methane

In other hydrocarbons, each carbon atom forms bonds with one or more other carbon atoms. The simplest example is the gas ethane, which has two

earbon atoms. The link between these atoms uses one bond from each and leaves three free on each one to hold hydrogen atoms, as pictured below.

The ethane molecule shows a family resemblance to methane. If one hydrogen atom is taken from each of two methane molecules, the vacated links can bind the two carbon atoms together forming ethane. The group CH3-formed from methane is called *methyl*.

The dash in this formula represents the vacated bond. resents the vacated bond. Methyl docs not exist by

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H-C-C-H H-H H-H

itself in nature. It is a combining group, or radical, found only in compounds. Ethane enters into compounds as a similar radical (C2H5-) called ethyl.

Open-Chain Hydrocarbons

If methyl and ethyl radicals are joined end to end, they form a hydrocarbon called propane (C2H5) with three earbon atoms. Still more carbon atoms can be linked on, extending the earbon chain. Hydrocarbons of this kind may have as many as 70 carbon atoms. From the way the earbon chain can be extended, these compounds are often called "open-chain" hydrocarbons.

Each of these hydrocarbons has the maximum number of hydrogen atoms that can be held by the carbon atoms present. Hence these hydrocarbons are often called saturated. As saturated compounds, they are relatively inert. Therefore ehemists frequently call them paraffin hydrocarbons, from the Latin terms parum affinis, meaning "slight affinity." Natural gas and petroleum consist largely of this type of hydrocarbon (see Petroleum).

In other kinds of hydrocarbons, adjoining carbon atoms will use two or even three of their bonds to form a link with each other. Formation of this double

or triple bond cuts down the number of hydrogen atoms which can be held. Two simple examples are ethylene (C2H4) and acetylene (C<sub>2</sub>H<sub>2</sub>), pictured at the right. Compounds of this type are called unsaturated.

Ethylene Open-chain hydrocarbons of  $H-C \equiv C-H$ either saturated or unsaturated type are often called aliphatic hy-Acetylene drocarbons. The name is from a

Greek term meaning "oil" or "fat." It is given them because open-chain hydrocarbons are important constituents of oils and fats. Petroleum products are good examples of such compounds.

Under proper conditions, unsaturated hydrocarbons can be made to take up more hydrogen. This change is called hydrogenation. Processes which accomplish this were first applied to animal and vegetable oils to reduce their disagreeable odors or to harden them. The changes are ehemical, new compounds being formed (see Oleomargarine) Such ods are used in making soap and candles Cottonseed oil so treated is edible. Hydrogenation is also used to increase the yield of gasoline from crude oil to produce oil and gasoline from coal, and

#### in other processes Benzene (Aromatic)

Hydrocarbons An extremely important

class of hydrocarbons is the closed-chain-cyclic, or aromatucsenes It has as its fundamental unit the "benzene ring 'CaHa so called because of the shape of its structural furmula All the compounds of this series are unsaturated

The accompanying structural diagrams indicate some of the almost countless com-

pounds which the synthetic chemist makes by replacing one or more of the hydrogen atoms around the benzene ring with other atoms or combinations of atoms To make aniline, the parent of numerous dyes, only a single substitution is necessary Phenol or carbolic send has OH in place of one H of benzene In making naphthalene, another whole ring is added to the chain For the explosive pieric acid, three hydrogen stoms are replaced with NO2 and one with

OH (See also Coal-Tar Products ) HYDROCHLORIC ACID One of the most important ands in scientific work and in industry is this colorless compound of hydrogen and chlorine (HCl) It is manufactured by treating common salt (NaCl) with sulphuric acid (H2SO4) yielding sodium sulphate as a by product, also by burning chlorine gas maide contamers filled with hydrogen The pure product is a gas (hydrogen chloride), which develops acid properties only when dissolved in water A cubic foot of Bater will absorb 455 cubic feet of the gas

Gastric juice contains normally 02 per cent of hydrochloric acid It helps to dissolve the minerals m our food and acts in part as an antiseptic Hydrochloric acid unites with most metals and metallic ordes to form salts known as chlorides (see Chlorine) Hydrogen Most Americans know that the expresson 'H 2-0" means "water" It is a chemical symbol which means that a molecule of water consists of two atoms of hydrogen (chemical symbol II) joined to one of oxygen (O) Chemists write it as H2O Hydrogen owes its name to its part in forming water It was comed from the Greek terms hydros for "water" and genes for "parent" or 'born from "

In its pure state, hydrogen is a gas without taste, color, or odor It is one of the commonest of all the chemical elements Hydrogen is found from a conaderable depth in the earth to the uppermost limits of the atmosphere The spectroscope shows that it is

DENZENE AND SOME DERIVATIVES

Naphthalene

At the upper left is the benze ne ring parent com of many arematic substances. Two rings so and together make nashlhalene. Various substant one for the hydrogen atome in benzese form anilino and pieric acid

shandant in the sun and the stars It enters into hundreds of thousands of compounds, and is one of the four most abundant elements in all livmy tissue (see Hydrocarbons)

Hydrogen is the lightest of all elements When it is free m the air, it tends to escape to the upper atmosphere This tendency makes it the most buoyant gas for balloons But it is inflammable and so the slightly heavier gas helium is preferred (see Helium)

Hydrogen can be made to give one of the hottest flames known about 5 000°F One way this heat is applied is by means of the oxyllydrogen blowpipe In this jets of hydrogen and ovygen from dif-

ferent tanks are mixed in the proportion of two to one As they flow from the blowpipe tip they burn with a flame so hot that it can cut metal almost as easily as a knife cuts cardboard

Hydrogen can be obtained by passing steam over coke or coal This yields hydrogen mixed with carbon monoyide or diovide, which can be removed. If natural gas is passed over brick heated to a temperature of about 2 200°F it decomposes into carbon black and hydrogen Hydrogen can also be obtained by electrolysis (see Electrolysis)

Varieties of Hydrogen Atoms

Many facts about hydrogen can be explained from the electrical nature of its stoms (see Atoms) As its nucleus it has one particle (called a proton) of positive electric charge With this is one particle (an electron) of negative charge Two is the smallest number of particles that can form an atom and for this reason bydrogen is the lightest element

This simple atom of two particles is the commonest type, or asstope, of hydrogen Chemists call it pro-Two other motopes have been found 1931 Harold C Urey obtained double-neight hydro gen by electrolysis of sodium hydroxide solutions This hydrogen with a mass number of 2 has one neutron as well as a proton in its nucleus. It is called deutersum from the Greek for 'double" ' Heavy water" denser than ordinary water, can be prepared Triple-weight hydrogen by burning deuterium (britum) was obtained by Ernest Rutherford in 1934 It has two neutrons and one proton in its nucleus It is produced naturally by cosmic rays which bombard and split mitrogen atoms in the upper atmosphere It can be prepared artificially by bombarding lithium with neutrons in an atomic reactor Both deuterium and tritium would probably enter into the manufacture of hydrogen bombs (see Atoms)

Two varieties of hydrogen called ortho- and parahydregen were demonstrated by K F Bonhoeffer of Germany in 1929. They were unlike in heat conductivity, solubility, and other properties. This is explained by the theory of a spinning proton nucleus. In ortho-hydrogen both nuclei of the molecule (H<sub>2</sub>) are spinning in the same direction, while in parahydrogen the two spin in opposite directions.

Hydrogen Ion Concentration

In the normal atom, the opposite charges on the proton and the electron offset each other, and the atom is electrically neutral. But the hydrogen atom can lose its electron and evert the + charge on the proton. In this state, the atom is called a hydrogen ion (see Ions and Ionization).

Hydrogen ions are important in many chemical reactions, but particularly those of acids. Chemists have adopted the practise of measuring acidity (or its opposite, alkalinity) by the concentration of hydrogen ions in a substance. For their basis of measurement, they use water.

Even the purest water is partially ionized and contains some free H+ and OH- ions in addition to its  $H_2O$  molecules. Each liter of pure water has one tenmillionth of a gram of H+ ions and an equivalent amount of OH- ions. Addition of an acid to the water increases the proportion of H+; addition of a base decreases this proportion. To avoid such terms as ten-millionths, the logarithm of ten million, which is 7 (see Powers and Roots), is used as a base number with the symbol pH, that is, the hydrogen ion concentration of pure water is expressed as pH 7. This is the neutral point. Higher values indicate alkalinity and lower values acidity. Thus a solution of pH 8 has ten times greater concentration of OH ions relative to H ions than has a solution of pH 7.

What Hydrolysis Means

In many chemical reactions, the count of atoms in the end products amounts to those present at the beginning, plus addition of atoms corresponding to molecules of water ( $H_2O$ ). Often the water equivalent appears separated into H and OH parts in different end products. Such a change is called *hydrolysis*.

The chemical symbol of hydrogen is H. It has been liquefied at -423°F. and frozen at -434°F. The atomic weight of hydrogen is 1.008, and the atomic number is 1 (see Chemistry). (For the actual weight, see Atoms.) HYDROM'ETER. A floating body sinks deeper in a light than in a heavy liquid. This principle is applied in the hydrometer (from Greek words meaning "water measurer"), an instrument for determining the specific gravity, or density, of liquids. It is usually a glass tube, weighted at one end to keep it upright, and marked with a scale. This scale may directly indicate specific gravity, or it may consist of arbitrary degrees, as in the Baumé scales. Common uses of hydrometers are to test solutions in storage batteries and automobile radiators, and to determine the richness of milk. HYENA (hī-ē'nā). This unpleasant animal, about the size of a large dog, is noted for its cowardice and the unearthly shrieks, like the laughter of a maniac, which it utters when excited. It lives in caves and holes in Africa and southern Asia, sleeping by day and coming out at night to feed on carrion and start its unearthly howling. The hyena performs a valuable service to the health of the communities which it infests by devouring dead animals and thus acting as a scavenger. It does not dare to attack an animal that is standing still; but it often so terrifies horses and cattle that they run till they fall from exhaustion. Then the hyena tears its victims to pieces. It was formerly much dreaded in South Africa, where it often entered Kaffir dwellings at night and carried off children sleeping beside their mothers.

These carnivorous mammals are related in structure to the cats and the civets. They are ungainly

creatures with large heads, and their forelegs are longer than the hindlegs which gives them an awkward shambling gait. Their powerful teeth and jaws are capable of crushing the hardest bones.

Hyenas (family have Hyaenidae) four toes on each foot, long forelegs. nonretractile and claws. The chief varieties are: Hyaena striata, striped byena, found in India, Iran, Asia Minor, and north and east Africa; Hyaena crocuta, spotted hyens, South Africa.



These are striped hyenas, feasting on the carcass of some creature killed by a hon, perhaps, and left half-eaten. Two jackals snarl at the hyenas for a share in the meal.

HYGROMETER One of the important factors which the Weather Bureau must take into account in making its forecasts is the humidity - the amount of moisture in the atmosphere 'To measure this var ious instruments are used, called 'hygrometers" One of the simplest is the

toy known as the weather house," at the door of which a man appears if the weather is about to be wet, and a woman if it is to be fine It is operated by catgut threads, which grow shorter as the humidity increases and lengthen as it decreases, thus moving the figures Hair also contracts when moist. and is used in the hair hygrometer, moving a needle on n scale as it changes in length

The wet and dry bulb hygrometer, also called the "psychrometer," 19 the most generally used In the 'sling psychrometer" type two thermometers are fastened side by side on a stand, exactly alike except that the bulb of one is covered with wet muslin The thermometers are then whiled or fanned and the evaporation of the moisture in the muslin tauses a fall in temperature in the wet-bulb thermometer — rapid if the day is dry, and slight if it is damp. The dry thermometer records the actual temperature of the air and by comparing the two readings the humdity can be determused from a set of prepared tables

Another type is the dew point or condensing hygrometer This makes

use of ether, which evaporates very quickly and soon cools one of the thermometers down to the point at which the moisture in the air begins to tondense as dew From the dew point and the temperature of the air as given by the other thermometer, the relative humidity can be determined In chemical hygrometers the moisture in a given vol-

ume of air is absorbed by some such substance as calcoun chloride or sulphuric acid and the increase in weighl gives the amount of moisture

Hyprometers are used in many modern schools and office buildings to measure humidity so that mois-

ture can be thrown into the air when the air be comes too dry (see Heating and Ventilating) They are also used in industries in which humidity is a factor such as the manufacture of tex-

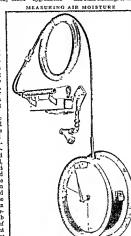
tiles cigars, and paper Many HYPNOTISM strange occurrences which were once looked on as miracle, magic, or delusion have been explained by modern science as results of that little understood condition known as hypnosis or hypnotism condition resembles nor mal sleep except that the hypnotized subject may retain some of his powers to act such as the power to walk and talk, and the shility to understand what is said to him At the command of the operator the patient may lose all feeling in a leg or an arm so that a pin can he thrust in without pain The heart heat can he made slower or faster a rise in tem perature and perspiration can he induced and there are records of cases where drops of blood

were made to coze through the skin

The hypnotized person will obey ridiculous orders and carry out feats of skill and strength unnosable to him under normal conditions He will "see" people who are

not there and if told that a person, who may actually be directly in front of him, has departed, he will beheve it, and may even try to walk over the spot where that person is standing

In light hypnosis a person may remember the facts of his normal life and may recall when he "wakes un" what he said and did while hypnotized, but deep



en user the face of the or contract. This movement sunting by clockwark card, which is kept alowly turning by clockwark card, which is kept alowly turning by clockwark

hypnosis produces a complete loss of memory in both respects, unless the operator orders the patient to remember something. Perhaps the most useful feature of hypnotism is found in what are called "posthypnotic suggestions." These are suggestions made to the patient while hypnotized which he will earry out afterward. For instance, if the operator tells him that, when he awakens, he must take off his coat as soon as someone coughs four times, the patient will do so, without being conscious of the reason for the action. It is this effect of hypnotism which is used by certain medical specialists in breaking drug habits and other forms of nervous diseases.

## How the Hypnotist Controls His Subject

To understand even the simplest facts of hypnotism one must realize that the brain functions in such a way that we are aware of some of our activities and not of others. When we are asleep we are not aware of our surroundings. When we act "absent-mindedly" our brain is controlling certain acts without our attention being called to this fact. Moreover, the brain is sensitized to certain stimuli more than to others. The fireman sleeps through any amount of ordinary noise but springs up at the faintest tinkle of the fire alarm.

A similar condition is produced in hypnosis. The subject is given suggestions by the hypnotist which make him quite unresponsive to the ordinary forms of stimulation. He is not in a true sleep but he acts as though he were asleep. The hypnotist has told him to sleep but also to listen and be ready to respond

to commands or suggestions.

Like the fireman, the hypnotized person is sensitized and will respond to certain stimuli; in this case those brought to him through the voice of the hypnotist. The suggestion that he is asleep and the fact that he has previously agreed to eo-operate with the hypnotist make the subject less critical than he would be if normally awake. The hypnotist tells him that he cannot open his eyes, that he may try, but that he will not succeed. He feels that what the hypnotist has said is true. He tries but fails. In a similar fashion he follows other suggestions. He follows suggestions, that is, unless they are such as to make him do something which conflicts violently with his moral sense. He would not, for example, be likely to take off all his clothes in public. A suggestion like this would cause the individual to reassert himself and the hypnotist's power would be at an end. People have been made to commit fake crimes under hypnosis, but there is every reason to suppose either that they had latent criminal tendencies which came to expression during hypnosis or that they were aware all along that their act would not constitute an actual crime.

The methods used to produce hypnosis are usually simple. The patient is asked to fix his eyes on some bright object and to let his "mind become blank" as far as possible. The hypnotist says some soothing words, speaking in a monotone, and perhaps at the same time stroking the patient's head or passing his hands before the patient's eyes. It is suggested that

the patient will go to sleep, that his eyes are getting tired, that his eyelids are getting heavy, that his muscles are relaxing, and that he will soon be fast asleep yet ready to follow the suggestions of the hypnotist. Sometimes, within a few minutes, the eyelids will tremble and then gradually close. Then the suggestion that the eyes cannot be opened will be used to test the degree of control that the hypnotist has attained over his patient. The subject is usually wakened at the command of the hypnotist. Without the eommand, however, he would waken of his own accord or go into a normal sleep from which he would waken normally.

In order to produce hypnosis, the hypnotist must have what is commonly called "prestige." The more firmly the patient believes in the power of the hypnotist, the more readily he will give way to hypnotic suggestion. Thus it is especially difficult to hypnotize one's best friend. In any event, hypnosis should be left to the medical man or to the clinical psychologist. When used by untrained persons it may have undesirable aftereffects and may even be dangerous.

Leaders such as Hitler are credited with having produced a sort of group, or mass, hypnosis. It is commonly said that fakirs who do "impossible" tricks have hypnotized their audience. Scientists reject the notion that masses may be hypnotized against their will, but they admit that crowd situations, especially involving a leader of great power, can produce a heightened degree of suggestibility similar to that involved in hypnosis.

#### Mesmer and Mesmerism

When hypnosis first claimed the attention of scientists, it was called "animal magnetism" or "mesmerism," after Dr. F. A. Mesmer of Vienna. In the late 18th century, Dr. Mesmer used it to heal certain nervous ailments. He thought some sort of magnetism, animal rather than material in nature, went from him into his patients. For many years mesmerism was a great mystery and generally associated with stage performances, fraud, and superstition.

Medical men at first denounced it and Mesmer's claims. They began to use it in surgery, however, before the discovery of anesthetics. Surgeons found that a deeply hypnotized patient will lie perfectly still and without pain during operations, even those as serious as an amputation. A doctor named James Braid about 1840 coined the term "hypnosis," which means a "nervous sleep." The new name was more acceptable than mesmerism, with its implications of fraud, and it soon supplanted the older term.

Hypnosis now has a firm basis in science. Psychologists use it in their laboratories to study human behavior and mental diseases. Psychiatrists and clinical psychologists often use it in the treatment of nervous disorders. It is sometimes combined with psychoanalysis under the name "hypnoanalysis." Some doctors and dentists still use hypnosis as an anesthetic in cases where, because of heart or other adverse physical conditions, the more convenient anes-

thetics cannot be used.

# THE EASY REFERENCE FACT-INDEX

GUIDE TO ALL VOLUMES FOR SUBJECTS
BEGINNING WITH

# G-H

#### TO SAVE TIME

## USE THIS INDEX

EDITOR'S NOTE ON NEXT PAGE TELLS WHY

#### SPECIAL LISTS AND TABLES

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FACTS ABOUT THE GREAT LAKES	495
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Numerous other lists and tables in the fields of geography, history, literature science mathematics and other departments of knowledge will be found with their appropriate articles in the main text

# EDITOR'S NOTE

VERY user of Compton's Pictured Encyclopedia should form the habit of first turning to the Fact-Index section at the end of each volume when in search of specific information. This index is a miniature work of reference in itself and will often give you directly the facts, dates, or definitions you seek Even when you want full treatment of a subject, you will usually save time by finding in the index the exact page numbers for the desired material.

All page numbers are preceded by a letter of the alphabet, as A-23. The letter indicates the volume. If two or three page numbers are given for the topic you are seeking, the first indicates the more general and important treatment; the second and third point to additional information on other pages. Where necessary, subheadings follow the entry and tell you by guide words or phrases where the various aspects of the subject are treated.

The arrangement of subheadings is alphabetical, except in major historical entries. In these the chronological order is followed.

The pictures illustrating a specific subject are indicated by the word picture or color picture followed by a volume indicator and a page number. A picture reference is frequently intended to call attention to details in the text under the illustration as well as to the illustration itself. This picture-text, therefore, should always be carefully read. The pictures are usually on the same page as the text to which you are also referred; sometimes they are found in a different but related article which will add interest and information.

The pronunciations given are those preferred by the best and most recent authorities; alternative pronunciations are indicated where usage is divided.

In recent years hundreds of foreign geographical names have been changed, either officially or by custom. Both old and new names are given at the appropriate places in the alphabet.

Populations are those of the latest census or an official estimate when available if no census has been taken since World War II. Distances between points are map or air distances, not distances by railroad.

## THE EASY REFERENCE FACT-INDEX



OUR LETTER G probably started in ancient Egypt as a sign for an angle in a wall (t) Shortly after 2000 BC a Semitic people called the Seirites adopted it as an alphabetic sign for the hard sound of g (as in gay) because to them the sign looked like a carpenier's square and their name gimel for 'a square began with this sound These people used a crudely made square (r) for the letter. The later

Campanite Phoenician writing gave the sign a simple form (5) suited to writing in Semult fashion from right to left. In Hebrew the sign was called gime! and other Semittic languages had similar names. In all these alphabets, the letter had the third place after A and B

The Greeks took buch the angular form and the pronunciation of the Phoenician letter muo their writing but they changed the name to gamma, and

gradually they gave the letter a more pleasing appearance (4) When the Romans took over the Greek alphabet they gave the sign a rounded shape and turned the opening to the right (5). But for a time they used it for the same sound as k. Thus they had two signs for one sound and none for the hard | To remedy this lack they gave the C sign a tail and this made a G (6) They also made is the seventh letter of the alphabet in the old place of the

Greek Z which they were not using at this time The capital letter came from Lann into English without change, but after the Norman conquest of England the English adopted the French practice of pronouncing a soft g (as in gem) before e, and y, in words of French, Latin and

Greek origin (ginger gininasum)
Our handwritten small g was developed from the capital by using a loop at the bottom for speedy writing (7) Our printed small g is a form of the hand written one

NOTE -For the story of how alphabetic writing began and developed see the articles Afphabet Writing 

01 02 03 C-1 designations of US Army general wast A 355 Gabe town in israma Empire See in folder lefabra, the gown or commend to wear that Lefabra was were compelled to wear the commendation of the commenda

Gabbre an igneous rock M 266

Gabbre an kensous room he see in Reder Pork Labie Sabile (do bet) in ohl Engish and European iaw a fax excise for p at or duly a French Indiory a sail lax abolished 1700 F 281 Gabbre he in Paris Chapters Gabers Ace in Index Greters

table (dabl-l) an enicity of Lait um 12 ul e of Rome captured by Tarquinius superbus excavai ons Tanuining Superbus excavations have yielded notable works of art Ariemis of Gabit picture E 443 Cabin tos Autos (died 47° 5°) Rowar politician as tribune 65 5°C with the Ariemis of the A was positician as tribune 65 sc established (atbilian lew which kake pompey command in Mediter rahean consul 5s sec procured in Syria 55 sc banished for extor ten though defended by Corro whom he had exiled white consul-able free-

whom he had extied white consume the Carke (born 1901) mother pleture actor born Cadle Obio was Academy award for performance in ii Happened One Night Obio Carle in World War IJ (Mining Whose Bounty Cone With the Wood Cone What Command Dec ston i Gable in architecture A 319 pictures A 198 204 214 See giso in Index

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73) French ariter of delective
atornes i Monsteur Locoq "The
blaves of laris Other People's

Money ) Gabriel (ga bre et) archangel and heavenly messenger sent to the Virgin Mary (Luke i 13 26) the prophet Daniel and others recog nized by Mohammedans as well as Christians and Jens commemorat ed as saint in Roman Catholic church Wareh 24

character in Paradese Lost M 280 Cabrillous sch (gab-rel 60 teb) Gentp (1878 193e) planiet and conductor born Si Petersburg thow Lenin grad) Russia married Clara Clem ens dauchter of Mark Twain conductor Detroit Symphony Or

chesira 1918-36 Gad in Bible son of Jacob ancerior of Inrachie tribe of Gad also name seer and chronicler of Print David a reign

Ca lames or Gha lauten (ga da rice) stames or Link man on the first of the 1 to of link sahara about 300 ml aw of city of Truots pop 2755 maps A 187

A so of H (god de) family of Florenline artists of whom most important was the architect and pointer Taddes (1900-1950) pupil of Godto and to have contine Gidto s work on Florence and the and to have planned the Ponte

Gads (padz) Vels Wilhelm (1817-90) leading Danish Romanticist composed his much is lyrical and

highly polahed wrote symphonics everiures unies and songs (Erl King's Daughier The Springtide Phantary "The Cruvaders)

Gadfiy Ren in Index Hornefly Cadfy of Athens nickname of Soc

Cadelin (god 6 lin) Jahan (1760of attrium Gadolin inm a chemical element to

Gads den Christopher (1724-1805) 2 ads the Christopher (172-1805) a jeader in American Revojulion born Charleston S C delegate to Con Hoenial Congress 1774 76 briga deff general Cont nepial Army 1775-78 voted for ratifical on of II S Constitution 1788

Gadaden James (1788 1803) dipio mat grandson of Christopher Gads den born Charleston S C as minister to Mexico negol ated Gadaden Purchase (1853)

wadsides Alk manufacturing city on Gooks River 58 min es of Elyming, have near Lookoui Mt pop 55 725 coal and from and limber region from and steel cottop, fires farm marchinery and lumber products A 116 maps A 250 U25 Gaddrin ling F 130c color picture F 178 Cadaden Ala manufacturing city on

Gadades Purchase territory 5 of Gila

River in Arizona and New Mexico bought by U S from Mexico in 1553 U 377-8 map U 178 Cad # Hill, home of Charles Dickens

Gadwall or army duck a surface feed ing duck (Ange strepera) D 159

Gaea (jë'a), or Ge, in Greek mythology the ancient goddess "Mother Earth"; corresponding Roman goddesses were Telius and Terra: U-405, R-132

intercedes for Daphne D-17

Gnelic (gal'ik), ancient language of Ireland and Scotland I-227-8, I-234 college, Cape Breton Island C-118 Gnelle League, in Ireland I-230a-b, I-234

Gaels (galz), ancient Celtic peoples of Ireland and Scotland, who spoke

Gaelic language.

Gaeta (ga-a'ta), Italy, strongly fortified seaport 45 mi n w. of Naples; refuge of Pope Pius IX when he field (1848-50) from Rome: Francis II of Naples surrendered to Gari-baldi here in 1861 after long siege

Gaff, a spar, diagram S-151, picture B-216. See also in Index Nautical

terms, inble

Gaff, in fishing, list F-118h  $(\bar{g}\bar{u}\bar{g})$ , Wanda (1893–1946), artist and author, born New Ulm, (1893-1946). Gác Minn of Bohemian parents; writer and illustrator of children's books ('Millions of Cats', 'The A.B.C.
Bunny'; 'Gone Is Gone'; 'Snlppy
and Snappy'; 'Growing Pains',
story of how she grew up)
Illustrations S-411, plctures G-217,

5-404

Gage, Lyman J. (1836-1927), financier, age, Lyman J. (1836-1927), mancier, horn De Ruyter, N. Y.; secretary of treasury 1897-1902; president U. S. Trust Co. N. Y. 1902-6; a leader of Middie West banking interests; president board of directors, World's Columbian Exposition, Chicago

Gage, Thomas (1721-87), British general, governor of Massachusetts and eral, governor of Massachusetts and military commander in chief in America at outbreak of American Revolution: entered army 1741; went to America, under General Braddock, 1754; with Braddock when he was defeated by Holdans, 1755; superseded by Howe after Bunker Hill Bunker Hill

Lexington and Concord L-178 Gage, measurement. See in Index Gauge

Gage plam P-322

Gag resolution, a rule adopted by Congress in 1836 which provided that all antislavery petitions submitted to Congress be disregarded C-331 John Quincy Adams opposes A-16 Gaheris (fäther-is), Sir, knight of the Round Table R-236 Gnln (fän), Johan Gottlieh (1745–1818), Swedish chemist and mining engineer, first to Isolate pure

engineer, first to Isolate pure manganese.

Gallinrd. Château. See in Index Châ-teau Gaillard

teau Gainaru Gnillard (gil-yārd'), David Du Bose (1859-1913), Army officer and engi-neer, born Sumter County, S.C.; neer, born Sumter County, S.C.; after 1908 in charge of construction of Panama Canal between Gatun and Pedro Miguel.

Gaillard Cut (formerly known as the Culehra Cut), section of Panama Canal P-63, pictures P-53-4

Galllardla (ga-lar'di-a), a genus of annual and perennial herbs of the composite family with showy yellow, orange, or red flower heads; native to w. North America; also called blanket flower

called blanket nower
how to plant, table G-16
Gnines' Mill, battle of, in McClellan's
campaign 1862, on Chickahominy
River 9 ml. n.e. of Richmond, Va.;

second of Seven Days' Battles.
Gnines'ville, Fla., winter resort 65 ml.
s.w. of Jacksonville; pop. 26,861:
maps F-158, U-253
University of Florida, picture F-150

Gainesville, Ga., city 48 mi, n.c. of Atlanta; pop. 11,936; poultry center; cotton, hosiery, thread center; cotton, hosiery, thread milis, leather and furniture fac-tories, Brenau College, for women; Riverside Military Academy: map G-76

Gainesville, Tex. city 62 mi. n.c. of Fort Worth, on Elm Fork of Trinity River; pop 11,246, oil fields, farming, livestock; Community Circus; Gainesville Junior College, Laite Texoma nearby: map T-90

Gniusborongli (yānz'bór-ā), Thomas (1727-88), English painter G-1

'The Honorable Mrs. Graham', picture G-1

Galrdner, Lake, in s. South Australia, maps A-488, 478

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Gniac'tose, a simple (monosaccharide) sugar (CaH12Oc), occurring in the brain and nerves; not found in nature and obtained by reduction of milk sugar (lactose) Galahad (gāl'a-hād), hero of Arthur-

lan legends G-1-3, pictures A-393-4,

Galápagos (ĝä-lä'pä-ĝōs) Islands (official name Archiplélago de Coion), also called Tortolse Islands from Spanish galdpagos ("tortoises"), group of Islands belonging to Ecuador, 2868 sq. ml.; pop. 1346: G-3-5, E-230, S-276, maps G-3, W-204, pictures G-4 lguana I-25

lava field, pictures S-258, G-4 national park N-39

Galata (gä'lä-lä), seaport, and suburb of Istanhul, on Golden Horn, ship-ping and trading: map I-258

Galatea (fål-a-te'a), in mythology, statue made by the sculptor Pygmalion and endowed with life by Venus in answer to his prayer; also, nymph in various legends.

alati (gā-la'tsē or gā-lats'), or Galatz (gā'lats), Rumanla, Danube port in the east; pop. 100,000: D-16, maps B-23, E-417

Galatia (ga-la'shi-a), ancient country in central Asia Minor

Ceits found kingdom C-163

Gala'tians, Epistic to the, 9th book of the New Testament, written by the Apostle Paul to the Galatian churches about A.D. 56.

Galatz, Rumania. Sec in Index Galatt Galaxy, in astronomy A-443, N-106-7, S-370-1, picture S-370 Milky Way, See in Index Milky Way

Galba (gal'ba), Servius Suipicius (5 B.C.-A.D. 69), Roman emperor for seven months

Nero overthrown by N-110

Galdhöpiggen, peak in s. Norway, highest in Scandinavia (8160 ft.), map N-301

Galdos, Bénito Pérez. See in Index Pérez Galdós

Gnle, Henry Gordon (1874–1942), physicist and educator, born Aurora, Ill.; with University of Chicago from 1699 (dean of division of physical sciences 1931–40); author of 'Proctical Physics' of 'Practical Physics'.

of 'Practical Physics'.

Gale, Zona (Mrs. William Llywelyn
Breese) (1874-1938), writer, born
Portage, Wis.; first wrote sentimental stories ('Loves of Pelleas
and Etarre', 'Frlendship Village');
later, realistic novels depicting
small-town life with fidelity and
humor ('Birth'; 'Faint Perfume';
'Preface to a Life'); won 1921
Pulitzer prize for dramatization of
her novel, 'Miss Lulu Bett': A-230/
Gale, a strong wind S-403, W-165 Gale, a strong wind S-403, W-165

Ga'len, Claudius (A.D. 130?-200?), Greek physician, celebrated ancient medical writer whose some 500 medical writer whose some 500 treatises (of which only about 80 now exist in print) were long accepted as authority: M-164b-65, picture I-202

theory of blood circulation B-210 Gale'na, Iii., city in extreme n.w. of state; formerly an important lead-and zinc-inining center, new trade and distributing point of a dairying region; many old and beautiful houses and public buildings; pop. 4648. map I-36

Grant's home G-152, picture I-42 origin of name L-141

settiement I-41

Galenn, Kan., city in extreme s e. Kansas; named for deposits of galena ore in vicinity; pop 4029; map K-11 Galenn (lead sulfide), a common ore of lead L-141, table M-176

used in early radio sets R-36 Gale'rius (Galerius Valerius Maxi-mianus), Roman emperor 305-311; from common soldier became Diocletian's son-in-iaw and successor Constantine and C-456

gives Christians freedom of worship

C-302 Galesburg, Iil., manufacturing city 40 mi n.e of Burlington, Iowa; pop. 31,425; railroad shops; packed

meats, bricks, farm machinery; Knox College: maps I-36, U-253 Gallein (ja-lish'i-a), Polish Gallela, former Austrian crownland on n. slopes of Carpathians; now in-cluded in se. Poland and in the w. Ukraine, Russia; area, more than 30,000 sq. mi.; petroieum and natuso, our sq. mi.; petroleum and natural gas in e.; timber; grains, potatoes; livestock: map A-497 seized by Austria (1772) A-498 World War I W-221, 225-6 Galicla, Spain, district in n.w. corner, formerly kingdom

people S-314

Gni'ilee (Hebrew border or ring).
Roman province in n. Paiestine:
land of Christ's boyhood and chief center of his active work: P-44, map B-138

Galliee, Sea of, or Gennes'aret, Sea of, also called Sea of Tiberias and Lake Kinneret, or Lake Chinnereth, large pear-shaped lake in n. Palestine traversed by Jordan River; 64 cm.; frequented by Christ and disciples: maps P-45, B-138, I-256 Gallieo (#āl-1-lc'ō, Italian gā-le-lc'ō) (1564-1642) gast Italian scientifications of the second statement of the second secon

(1564-1642), great Italian scientist G-5-6, protures G-5, P-230-1 attempt to measure speed of light

L-230 falling discovers law of G-171, pictures G-171, P-230 mechanics, contributions to P-232 pendulum discovery P-118, picture

A-155 telescope T-46, pictures T-47, P-231, 1-203

thermometer T-117

Gall, or Gallus, Saint (died A.D. 640?), Irish monk and missionary to Eu ropean continent; founded monas-tery of St. Gall, Switzerland.

Gali (Indian name Pizi) (1840-94). nii (Indian name Pizi) (1840-34), chief of Hunkpapa Sioux tribe; in 1868 refused to go to reservations, and in 1876 was chief leader in battle of Little Bighorn when Custer was killed; after 1889 judge of Court of Indian Offenses at Standling Book Agency in South Dakota. Ing Rock Agency in South Dakota. Gall, Franz Joseph (1758–1828), Ger-

phrenology P-227 Gall, a swelling on plants caused by

parasites. See in Index Galls Galla (jūl'a), one of an African Cushitic people A-39

Galland (gd lat) Anjoine (1648\_ 1717) French Orientalist first European translator of Arabian highla professor of Arabia at Coldes de France Paris A 292 Gallas powerful and most numerous of Hamilic peoples of Last Africa and Ethiopia E 402

Gelfatin Albert (1761-1849) Amert eriain Alberi (1761-1849) Ameri can economist and statesman born Geneva, Switzerland one of great eri of financiers. U.S. representa tiva 1795-1401 as secretary of treatury under Jefferson and Visdi treabury under Jefferson and Wadi on systemalized government a finances led megaliations Treaty of Gener (2423) minister Treaty of Gener (2423) minister England 1826 notable researches in Re and history of American India and history of American India Society of New York 1827 heiped found New York University Treaty of Oten, picture 31 23

Callain River Mont flows n 170 mi from Yelloweigne National Park, for 70 mi ihrough pictus-esque canyon to Missouri River maps M 367 374 pfeture M 367

Gallandet (fdf-q del ) Thomas B (1787-1851) educator born Phil (1787-1851) educator born Phil ade phia founder of first deaf mute institution in America D 25 statue by Daniel Chester Franch pic

fure F 265 Gallandet College (formerly Columbia Institution for the Deef) at Wash ington D C founded 1857 by Con Ington D C founded 1257 by Con Frés to extry on situation of deat now includes Kendall School for children and a graduate depariment of education supported by the Dia witch of Columbia Congress andow montor and tustion D 27 Date | Chester French status Fic

fure F 28a P 261 2, diogram D 21 Gail bladder L 277

F 241 2/4007cm D 21

Galle (55) to Johann Gottfriel (18121919) Garman satronomer d a
coverer of 3 comete first to ob
serva the planet Neptune

Galle (55) also Paint de Celle (1955-Calla (fol) also Point de Calla (puda

da gal) a port of Ceylon on avecual seized by Portuguese in 1518 forlined by Putch in 1642 Erilian a nee 1798 former center of apl a trade pop 42 098 maps I 54 A 101

Calleges (gdl yd gde) inhabitants of the district of Galleia Spain re-semble Portuguese Gallena (\$478 on) (derived from talley)

ralley) a linee or four decked saling vessel of 15th to 17th cen lury with lotty castles at bow the stern picture 9 153 Spanish Armada A 373 Galleria Villorio Emmanuele at Milan

Italy 31 247 Callery woods G 1885 Galley in printing an oblong sleet lray for type that has been sel

Calley of boat See in Index Neull callerms lable Galley on airplane picti re A 538 Galley thip prope led wholly or parlly

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Spanish Armads A 273
Galla.

Galley alaysa picture S 195 Galley O 320 I 150

Call goal also called gall midge fly of

order Diptera famili mpiidae or Honididae cludee the Hessian fly family Great which la Gallia, See in Index Gaul

Calliard I gas per 1) lively 15th cen tury Italian dance in triple time popular espe lally in England See also in Index Pasone Galli Corel | fal le kor che)

n Igal lê korekê) Amelîta Homer Samuelo) (born (Mrs. Honner Samuele) (born 1889) Italian American cooralura soprano born Mian Italy of Italian Spanish parentage studed plano in Royal Conservatory Milan and taught there was practically and taught in voice debut 190) in Rome italy as Glids in Rigojetto sang with Chicago and Metropoli tan opers companies sang publicly only a few lines after a threal operal on in 1838

Gallieni (dal pa ne ) Joseph Simon (1849-1916) French general and colonial admin strator conqueror and parificator of Madagascar (1695-1905) n fillery governor of

Par 9 1 1914 15 first builds of Morne W 220 M 28 balllarmes (gal s for mer) an order of fowilike ground dwelling birds inc ud ng guana grouse qualis pheasanis turkeys and domestic chickens

enickena
Gaillaula (fall sail) water bird re
rembling cost and rail in habits
and fike them called mud hea R 67
Gailla Lochus Josens tonesus (1st
century AD) Roman precensul century Ap) Roman process (list century Ap) Roman process of Gr nous of these things when the Jews haled the Apostle Paul before him care est Gallio has become a gracelym for as indifferent per

a synonym for an laddfirent per son older hrother of Seneca Gallipell (\$\frac{\text{d}}{2} \text{ for } \text

of Turks taken in 1353 may G 188
Gallipall Pealents (anchein Cherconcepts) and anchein Cherconcepts and the Europe in the County of the Europe in the Eu advocales allack C 305

Callillein

advocates allack C 395

callitin Beneiries (1770-1840)

Roman Catholic missionary born

The Hague zen of Russ an prince

cama lo America 1792 and ordained

priest in Rallimers 1795 Counded

a colony at Loreito in a w Penn

advantal City of the Mark ordained

and the Colony at Loreito in a w Penn

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N 301 Gall midge See in Index Gall grat Gall mitee S 347

Call nut. Ser in Indea Galls Gal Son & unit of measure table W 87 tial ion a unit of measure 1thte W 87
Gal'formy Joseph (1731 1803) law
yer born West River Md tried to
effect compromise between Colonies
and Greal Briban Joined Er tish
army when war was declared R 125

Galla vay former division of a w 9 otland comprising counties of Kirkendbright and Wigtown fa move for Calloway cattle datrying Gallaway breed of beef callie C 148 chief industry

Galla abnormal growths on leaves stems bnos flowers or roots caused by various parasites—especially in secte and mittes and more rarely by nematodes bacteris fungi slime molds and eighe found on almost ell forms of plant life but espe cially common on oak trees, will lows roses and goldenrod

insects and mites cause I 159 163 oak galls or gall huls O 320 ink from I 150 tanning leather L 148 all alereographic projection of map 15 24 disgram bi 85

ht to diagram ht 85 Gallup Cearge Horace (born 1901) statistician born Jefferson Jowa professor of journalism at Columbia University in 1935 founded Ameri can Institute of Public Opinion 1The Gallup Poll) for measuring public opinion on specific questions See also in Index Institute of Pub He Opinion

asi opinion
silies N M cily 150 ml w of
Sanla Fa pon 9133 in coal mining
dielrici trading poini for Navajo
reservation annual interirbal Gallen indian ceremonial maps N 176 T1 250

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Gallaw Salai See in Index Gall Saint
Galop a spirited dance in 2/4 lime
popular in 19th century France
and Englend thought to be of
German or sin probably received german or gin France old names German Hopser ( hopper ) Rut echer ( si der ) also lie mue o Galap Rapide in St Lawren e River 8 10

Galaworthy John (1867-1933) Eng ish novelet and dramatist G 6 E 582s See also in Juden Forsyle Sata ch af piaya D 156 Justica picture D 125 ch af

expressionism D 133

expressionism D 133
side (pqil) Siralexander T (1817-637) Chandian stateman intro-637 Chandian stateman intro-ceded to the control of the control of the con-tective satelli promoted floateston of British North Amarican pro-fuces are of John Galt Canadan Company Coloniers and novelies, born Irvine Ayrahira, Scotland, 282-29 was promoter of the Canada Company site known for h a novala of Scot Ealt

alto known for he novela of soot tash Hfs and industrial center on Grand River about 55 m aw of Toronio pcp 10 207 bolars an gines lexiles brass goods shoes Lumber safes mops C 72 64366 Galt

Galiler (Jolt ya) Lecian (181 68) French missionary priest gave name to Si Paul Minn S 23 (1811 gave name to St Paul Airm S vs Geltan Str Francie (18\*2-1911) English anthropologist and meteor ologies noted aludant of heredity cousin of Charles Dura n made first attempt to chart weather on cytensive scale and propounded

anticyclone theory biometry founded by B 154 contributions to study of psychology I 113-14

ugeales E 413 heredly slud es H 344

beredity sludes H 366
siliants (541 16 At a) or commerchyceleth a genus of planls of Illy
family nalive to S Africa flowers
on long scape (elem) fracrant
white or linged green bell shaped
one common species G candidate Gelleela

te often listed se Hyacinthus candi CGTS (fa lup pê) Baldaesare abupil (\$\tilde{p}\$ its p\$ p\$) Raldaesars (1756-85) Its lian composer called II Buranello from his birthplace the island of Burane near Venice moted harpsichord player comic operas enjoyed great popularily also wrote excreted muelc Brown large A Toccais of Caluppi refers

an imaginary extemporization by the composer alvani (fal-10 mč) Luigi (1737-98) Italian analomisi deroverer o electric phenomena called gaive niem E 308 picture E 307

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current electricity E-308 Gal'vanized iron, iron coated with zinc

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Wheatstone Bridge, picture E-300 Gal'reston, Tex., one of greatest cot-ton-exporting ports in world, pop. 66.588: G-7, maps U-253, inset T-90, picture G-7

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Galvez (gal-vath'), José de (1729-Galvez (gal-vath'), José de (1729-56). Spanish statesman, noted as colonial administrator; important influence in colonizing of American Southwest: S-308-308a San Diego S-40 Galway (gal'vai), largest county of

largest county of Gonnaught province, Ireland, in middle of w coast (area 2223 sq mi., pop. 160,204); also seaport (pop. 21,316) at head of Galway Bay: maps 1.227, B-325

Bay: maps 1-227, E-325
Galway Bay, on west coast of Ireland: reaches 30 mi, inland, Galway County to Clare County: map E-325
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Conten States and Mexico.

Gamalle! (\$\overline{ga-\text{in}}\verline{a}\), a Pharisee.

Paul's instructor in law (Acts xxil,
\$\overline{3}\); advocate in the Sanhedrin of
moderate treatment of the Christian
apostles (Acts x 34-9)

moderate treatment of the Christian apostles (Acts v. 34-9).
Gambarelli, Antonio. See in Index Rossellino, Antonio
Gambeila, also Gambela, a trade eenter in w. Ethiopia, leased to the government of Angio-Egyptian Sudan; pop. 600; E-403, map A-46 Gambet'ta. Léon (1838-82) French

Gambet'ta, Leon (1838-82). French statesman and orator, anti-imamberta, Leon (1836-82). French statesman and orator, anti-im-perialist during Second Empire and Republican leader during and after Franco-Prussian War; premier in

siege of Paris F-278

siege of Paris r-278
Gam'bia. British colony and protectorate in w. Africa on both sides of lower Gambia River; 4070 sq. ml.; pop. 278,858; cap. Bathurst:

relationships in continent, maps A-46-7, 41-2, 39 Gambia River, flows n.w. 1000 mi. imbia Kiver, hows a.w. 1000 mi. through French Senegal and British Gamhia into Atlantic at Bathurst;

Gambia into Atlantic at Bathurst; navigable for about 250 ml. Gambier, James (1756-1833). British admiral; in command at hombardment of Copenhagen 1807; commade admiral of fleet 1808-11; made admiral of fleet 1808-11; made admiral of fleet 1820 Treaty of Ghent, picture M-23 Gambier (Jöm'ber), the product of a vine (Ouropouria Jombir) of the madder family, cultivated in Singapore and the Malay Archipelago; used for tanning and dyeing. Gambog (Jöm-bög'), gum-resin R-116 Gambrel roof A-319. See also in Index Architecture, table of terms

Architecture, table of terms

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ton's lose of her needle. Gammon Theological Seminary, Sec

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Gamolepis (ga-möl'é-pis), an annual plant (Gamolepis tagetes) of composite family, native to S. Africa, wiry, low-growling; yellow or orange daisylike flowers; leaves leaves feathery; used in rock gardens.

Gamopet'alous plants, or sympetalous plants F-184, T-185

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Gamp, Mrs. Sarah, an unprofessional
nurse in Charles Dickens' novel
'Martin Chuzzlewit'; always ready
to hire herself out in many capacities for which she is unfitted; noted
for bulky umbrella (gamp): N-312
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Thoreau influence A-226d

Gandhi cap, emblem of Indian Na-

tional Congress members 1-62
Gancion (gán-lón'), officer or knicht of Charlemagne, who in jealousy of Roland betrayed Charlemagne and plotted the battle of Roncevalles in which Roland was killed; name has since stood for treachers

Gane'sa, Gane'sha, or Ganapat'l (San-skrit "lord of the host"), elephantheaded Hindu god of wisdom and remover of obstacles; chief of the minor delties who attend the god Siva.

Gang disk plow P-322

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del reino de Maya'): S-327
Gan'net, or solnn goose, a large sea
bird (Sula bassana) of the gannet
and hooby family (Sulidae); entire
plumnge white, except for black primaries: bill long, pointed, slavyblue; feet greenish-black: G-10,
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frigate bird robs F-297

Gannett, Ruth Chrisman (born 1895), innett, Ruth Chrisman (born 1895), lithographer, born Santa Ana. Calif.; illustrator of books for children: Miss Hickory', written by Carolyn Sherwin Bailey, which received Newbery medal 1947; 'My Father's Dragon' and 'Elmer and the Dragon', both by Ruth Silies Gannett; 'My Mother Is the Most Beautiful Woman in the World' by Reberga Reviter. by Rebecca Reyher.

Gannett Peak, highest point in Wro-

ming, in Wind River Range; 13.763 ft.: naps W-322, U-296 Gannon College, at Erie, Pa.; Roman Catholic; for men; founded 1944; arts and sciences, military science. Ganymeda (Talm'i-midd) in Greek my-

Ganymede (gan'i-mêd), in Greek mythology, beautiful youth carried off to be cupbearer of Zeus G-10

Ganz (gönts), Rudolf (born 1877),
American planist and composes,
born in Zurich, Switzerland; came
to U, S. 1900; director of St. Louis
Symphony Control of St. John Symphony Orchestra 1921-27; director Chicago Musical College rector Chicago Musical Ci 1928-33, president since 1933. Gapeworm W-303

sapeworm W-303
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Gapon (\$\bar{\theta}\bar{\theta}\$-1906), Russian priest, revolutionary and government spy; led strikers' march to Winter Palace on Red Sunday (Jan. 22, 1905); believed murdered by revolutionaries he had betrayed he had betrayed.

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Variation (1807-1906) one of the the wn of Vanual Vicence (44) line orn of Manual Vicence Gar da f ? almost 50 years professor in Royal Academy of Munic at Los a hillinged private teaching un ill his drath at age of 101 Jenny Lad was one of his pupils he in

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Cercia I oren Federico (1889-1956) Spanish port and diamaist born Guanda work traditional and hodern primitive and cu 'listed Lament for the Death of a Bull and cu finted Pomancero gliana poelry Bood Wedding

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to Garcia was inspired by the courage of Andrew S Rowan in carrying measure from United Slates to Garcia then en mound of the rely army at Spanish Amer can War at opening of Gued Roger Martin do Sen is I idex Martin du Gard Boger

Gar d. I she in Links of n Italy exterding from Lembard plant into The lent Alps map 1 282 operatio Carden Mary 1born 197")

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of Speach and Language Theory of Proper Names ) Gardiner Samori Rawson (1879-1902; English historian (History (1879of England careful nonpartisan and based on exhaustive study) Gardiner Slephra (1483"-1555) Eng

arather Neghra (1483"-1555) Eng fish bishop and elalese an auc cecled Wolsey as blubop of Win chrafer te mas largely responsible for fall of Thomas Cromwell | lord chancellor 1538-0) Gerdner Mans agricultural Irad center 2t ml n w of Worcester 1 D 19 agt giverware fuculture agricultural trade furniture

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Carifeld James R | 1865-1950) | kw-yer jubic official born Hiram Oblo win of President Garbeid secretary of interior 1907-9 in in Circuland Only after 1909

Carfield Lucrella Budoiph (1889-W 1284 Garifeld V.J., clly on Paresto Piver 10 mi n n of New York Cily non 27 351 lextiles embroidery chemi

cale cubler goods nachitery map Garfirld Heighle Ohlo residential and

industrial suburb of Cleveland pop \_1 652 map last! O 357 Garges 1 (der gand) mointaines pop -1 box man mert C ant strent (der cand) mointainoue pen mada, of s listy extending ab ul \$0 mi into Adrictic 1 268 augustus (or glus a) giant here of Rababasa sallra of that name Garagning appelle

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Trave led Roads short stories
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1934 French Canadian poel horr Quebec son of Francois V Gar neau versts marked by sensilive horn

neau verere mi Gurness Prançole Navier (1807-66) Canadian historian and writer; born Quebec: his 'Histoire du Can-ada' a standard historical work: C-106

Nance (born 1969). Garner. .lolin political leader, born Red River County, Tex.; congressman from Texas 1903-33; speaker of House 1931-33; vice-president of U. S. 1933-41 F. D Roosevelt and R-202

Gar'net, semiprecious stone J-349, pic-ture C-525

hirthstone, color picture J-348 Garnet lac L-82 Gar'nett, David (born 1892) English armett, David (born 1892) English author, grandson of Richard Garnett; called "realist of the impossible" hecause of his beautiful fantasies ("Lady into Fox": "Go She Must"); also wrote "No Love", modern novel, "Pocahontas" historical romance and "War in the Air, and the Air and th a study of the British air war in World War II.

Garnett, Edward (1862-1937). English author and critic, son of Richard Garnett; literary adviser to Conrad and Galsworthy; with his wife, Constance (1862-1946), trans-iated many Russian works; wrote "Tolstoy, His Life and Writings' and 'Turgenief A Study' edited edited 'Letters from Conrad' and 'Letters from John Galsworthy' Garnett.

arnett, Richard (1835-1906), English librarian and author, keeper of the printed books in British Museum; wrote lives of Cariyie, Emerson, Milton; 'The Twilight of the Gods', a fanciful retelling of myths, with Gosse wrote history of English literature

English literature
Garnler, Charles (1606-49), Canadian
Jesuit missionary born Paris,
France; came to Canada 1636; murdered by Huron Indians
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In s.w. France: rises in Spanish
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Gar pike, a river and lake fish with long, slender, rounded body P-256 Gar'rick, David (1717-79). British actor and manager G-26, picture G-26 pupil of Samuel Johnson J-360, G-26

pupil of sames Johnson J-369, G-26
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Faulks) (1874-1944), poet, born
Newark, N.J. ('The Joy o' Life and
Other Poems'; 'Earth Cry and Other
Poems'; 'The Dreamers').
Garrison, William Lloyd (1805-79),
American editor and leader of the

American editor and leader of abolitionist movement G-26-7, C-331, picture G-27

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dent imperialist, most powerful champion of Chamberlain's tariff reforms; editor of the London Observer, which he made a great organ of opinion, 1908-42.

Ga'ry, Elbert Henry (1846-1927), financier and promoter, born Wheaton, Ill.; chairman of finance committee and board of directors of U.S. Steel Corporation; Gary, Ind., named in his honor. named in his honor.

TEMPERATURES FOR CHANGES OF STATE IN GASES

SOLIDIFICATION LIQUEFACTION (DECREES, CENTIGRADE) (DECREES. CENTICRADE) -147.0Air (20.9% oxygen) - 60.0 -79.0Carbon dioxide -269.0 Helium -253.0 Hydrogen -260.0-126.0 Nitrogen -253.0 Oxygen

Gary, Ind., world's greatest steer-producing center; at foot of Lake Michigan, about 30 ml, from Chl-caro; pop. 133,911; G-27-8, map I-78, U-253, picture I-71 school system G-28

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Gas black, or earbon black. See in Index Lampbiack Gnscolgne (gas'koin), George (1525?-77), English writer, stepfather of

Micholas Breton; member of Par-liament 1557-59 ('Supposes', ear-liest comedy in English prose, adapted from Ariosto; 'Certayne Notes of Instruction', considered first English critical essay; 'The Steel Glass', verse satire).

Gasconade River, Missouri, rises in s. and flows n. 200 mi. to Missouri River, maps M-312, 318-19 Gas'cony, Prench Gascogne (gas-kôn'-

ye), former duchy in s.w. France; boundaries were Bay of Biscay,

Garonne River, and the Pyrenees Mountains map F-270 acquired by Henry II H-335 people F-259 redemption of "Landes" S-38 Gascony, Gulf of F-260

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papacy and trainy 19"9
Faspé igáz pal Philipps luberi da
(1786 i871) Canadish novellsi
khoze Les Anciens Canadish
(The Old Time Canadish) is de
talled picture of seignlorsi times

Gaspé a district and peninsula in a a Quebec projecting into Guif of St Laurence and consisting of an ei eyaied plaieau ifaversed by hoire evited plateau fraversod by Noire Dame Mis a consinuation of the Appalachians of the U S immer has and fishing viciled by fourisis because of scenery and picture-que villages utilizars of Gaspó (top-1851) scene of Carlier's Indians of stree C S S S S Carlier C S S C Carlier arects cross picture C S d Gasee B Citich vessel burned by

supre British vessel burned by Rhode Islanders R 143 Casperran fish fire in Index Alemife Compergon fish See in Index Drum

ossert (joe-pê rê) Airlêd de (1881-1954) Hisian stateman leader Childtan Damocrats born Tren ino organized anti Fancial Fraist 30% foreign minister 1944-45 prime minister 1943-53 slected president of Europsan Coal and Steel Community assembly 1954

I STE I S's Gaughan an attractive parannial of game Dictor area with large pin axis leaves and tall jurgle or white racemen native to Lurseta how to pint debts C 16 Gas patterns P Sel.

triant (fa ean de ) Pieces (1592-1653) French philosopher and wathematician combined Epicu real philosophy with Catholic dec trins (Syntagma philosophicum)
Gusst Herbert Spencer (born 1888)
hysiologisi born Plattasilie Wis
to whner with Joseph Brianger of 1944 Abbei prize (in medicine) for studies of eccirlo impulses car ried by nerves taught al Washins tea University Sr Louis 1931-31

si Consel University Ithacs NY 1931-3. director Rockefeller In situta for Medical Pescarch after reform Lucy Page (1866 1924)
reformer born Delaware Ohio
founded Anti Cigaretre League
1893 ai Chicago worked in Amer
lea and abroad for anticigaretie
least attempts of the company of th

Gaeta nia N C textile manufaciuring tout 20 ml w of Charlotte in farm ing region N 274 U 25 U 253 23 069

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Cal Lioya cen i rece com; Calcler lable pict re A 202 ( ate af Judament Albambra A 187 Cuts of Tears See is Index Bah el

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children's books born near San Jose Caif an children's librarian in San Joseph Valley she norked among boys and girls in migrani camps and a result of this expert ence she wrote Bine Willow other books with a Cal fornia sel ing are worth Fork and Little

(Mrs Frederick S Moure) (1875-1951) n ve si and play's right bern obskopee Mina play's fign poet agraupe: aum t The Bography of a Pra ris Girl Cop d 1 r to t Punch The foot List a Rich Girl no el and p ay) Gries Meraile (1725-1865) American

control born n England ser ed in Br lish army in America becom I g a friend of George Washington sejt ed in Virginia as a planier in 1772 in Ravo unon became # major general in Conilnental Army inabor general in Conjinculal Army in command at Wincipous Saratoga campaign and later at disastrous battle of Camben S C after Cam den Congress ordered an invest ga-tion of his conduct, but later

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colony (1611-14) set swil from
England 1608 in command of first
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Caten head manufacturing town in the England pop 115 017 opt oath Nea casile on This River here Da foo wrom Poblasch Crusoe may opi ostre D 954

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atos or sase a standard measure a device for issting standard measurements also a measuring or record as instrument biock af 231

firearms 1-80 kni jed fabrics F @ micrometer M 231 ralirozd frack R 61 2 gauges used ju sar ozs countries R 6

TAID 1 TZ Wire W 163 Gaurein (po 55u ) Paul (1848-1993) French painter father a French man mother a French Peruvian

man mother a krench Peruvian pionest positingnessionist in 1885 gave up bowiness and devoted full tims to painting lived and painted in South Ceas much of time troin 1891 especially in Tab is and in the Marquessa Islands where he died Gast (pril: Latin Gallis papes for and (pq1] Latin Gallis name for districts occupied by Cellio peoples (1) Cles pins Gapl now n Italy (2) Gaul proper or Translation Gaul now modern Fran e and Bel gium with paris of Holland Ger many and Switzerland

Barbarian invasions E 482 Vandals V 487

conquered by Romana C 163, C 14 Druids in C 183 Oswielter (gou il ter) Garman word meaning district manager

meaning district manager, under hor bar a Sam or official appointed to manage the same of the same of

Jehn af See in Index John of Gaunt Gaunt Gauntlet metal plated glover intro duced as part of armor of knights about 18th Century A gauntlei throun down was a chellengs to Eght Term applied to any long

loose cuffed giove loose cutted giove
Gaur (pour) or saur wild ox of in
dia Clai picture Claile
Gaura (pé po) a genus of annual and
perenniai plants of the evening
prumrose family najive to konin
Azzetica Large hairy leaves form
Toselis from with a iai sie; roseiis from whi h a jal sie i grows flowers while or rose in loose

spikes at top of siem fruit a 4 ribbed nut lke capsule Gauge (gows) Kari Friedrich (1777-Gauss (gour) Kuri Friedrich (1777-1855) German mathemailelan and physicist, renowned as masier of mathematical theory of electricity until of injensity of a magnetic field until of injensity of a magnetic field fastisms (flow 10-mg) or Column Gartisms (flow 10-mg) or Column

family name of Buddha B \$38 Gautier (go iya) Théophile [1811-

ic his personal ecceniricities have somewhai obscured his reputa se a literary craftsman of the first rank wrote excellent irayes se counts theaser and art criticism t Emaux el camées his besi poems
Mile de hiaupin his gresissi novel; 'Le Capitaine Fracasse', a novel; 'History of Dramatic Art in France'): F-288

Gauze, transparent, loosely woven cotton fahric of many uses; heavier grades are classed as cheesecloth. Gavarul (gd-var-ne') (1804-66). French caricaturist and illustrator; real name Gulliaume Chevallier; prolific critic of Parisian life, espe cially of the poorer and somewhat

disreputable classes. Gaveston, Plers (perz), earl of Cornwall (died 1312), favorite of Edward II of England, served briefly as re-gent 1708, was banished three times because of greed and insolence, but returned and was beheaded by the

barons

Gavlai (ga'ti-al), Indian or Malayan reptile of order Crocodilia, long, narrow, flat snout with lumpy tip: C-515

nvilformes (gū-vi-i-fōr'miz), an order of fish-eating water birds composed of the loops Gavilformes

Gaylas Point Dam, in South Dakota, on the Missouri River S-307, map M-325a

Gavotte (ga-vot'), originally a French after its introduction at court in 16th century became quieter and more dignified; popular as a theatmore dignined; popular as a theat-rical dance, special music for it written by many composers Includ-ing Bach, Gluck, and Couperin Gawaine (jg'irán), in Arthurian leg-end, nepbew of King Arthur and knight of the Round Table; called "the Courteous"

Gay, John (1685-1732), English poet and dramatist ('Beggars' Opera'; Polly'; 'Fables'), Sec also in Indez 'Beggars' Opera' Jiterary Intends S-469

interary friends S-469
Gay, Walter (18:6-1937), painter, horn Hingham, Mass: studied and lived in Paris, noted for still lifes; commander Legion of Honor (Benedicite; Las Cigarreras').
Gay, Zhenya, American artist, illustrator, and author of children's books; noted for distinctive lithographs; animals favorite models, especially cats ('Sakimura').
Gayal (pā'āl), species of native cattle (Bos frontals) domesticated in n.e. India and regions adjacent for its

India and regions adjacent for its flesh and skins; closely related to the gaur: C-141

Gayfeather, a perennial plant (Lia-tris spicata) of the composite family, grows wild from Massa-chusetts and Minnesota to Mexico. Has rough 6-ft, stem springing from Has rough 6-ft. stem springing from cluster of grassilke leaves; flower spikes 4 to 15 in. long of rosepurple, rarely white, bundlelike heads; used in medicine; also called Kansas gayfeather, marsh hlazing star, or llatris.

Guy'ley, James (1855-1920), metallurgist, born Lock Haven, Pa.; invented Gayley refrigerated dry-air blast in blast furnaces; 1901-9 first

blast in blast furnaces; 1901-9 first vice-president U.S. Steel Corpora-

tion (1901-9).

Gay-Lassac (yê-iŭ-sák), Joseph Lonis (1778-1850), French chemist and physicist, born St. Leonard. france; professor at feole Poly-technique, the Sorbonne, and Jar-din des Plantes; made an academician 1806; explained nature of prussic acid; discoverer of imporprussic acid; discoverer of impor-tant law of gases; ploneer in scien-tific halloon observations; with Louis Thenard Isolated boron.

Gny-Lussac's law. See in Charles's law

Gay Nineties, term for turn of 19th century in U.S., an era of lavish

display and social activity that resuited from accumulation of new wealth and growth of cities; whirl

wealth and growth of cities; while of amusements contrasted sharply with austere life of pioneer days. Gaza (\$\frac{ga}{z}a\$), Palestine, ancient town 50 ml. s w. of Jerusalem; most important of the five Philietine cities. It was taken by Alexander the Great, and later became a rival of Alexandria and Athens as a center of Hellenic culture; pop. about 38,000: P-202, maps 1-256, M-7,

Gazania (ga-sa'ni-a), a South African genus of perennial or annual plants of the composite family. Some stemless, with leaves in cluster, others short stemmed, all with white, woolly hairs. Flowers daisylike, solitary, on long stems, white, orange, or scarict, in some, base of rays spotted, hence name peacock gazania (G. par onta). Flowers close at night and leaves turn upward. Gazara, Canaan. See in Index Gezer Gazelie (ga-zel'), an antelope A-262, picture A-263

Gazetteer, a geographic encyclopedia R-881

selected list R-88h Alntab (in-tab'), Turkey, military post and trading center situated 60 mi. n. of Aleppo, Syria, pop. 72,743; textiles map T-215 GCA. See in Index Ground Controlled

Approach

Gdansk, Poland. See in Index Danzig Gdynla (ga-din'ya), Poland, port on dynam (yg-ain yg), Poland, port on Baltic sea a few mi n.w. of Danzig, pop. 117,702; construction begun 1921 hecause Poles were unable to utilize Danzig for naval or military purposes; port opened 1923; large coal exports; map E-416

Ge, in mythology. See in Index Gaea Gear, in inechanics, the moving parts or appliances by which motion is passed from one part of a machine passed from one part of a manner to another, picture M-161 automobile A-520-2, diagrams A-520-1; gear shift lever A-521; timing A-515, diagram A-515

Gear, nautical. See in Index Nauticai terms, table

Gear ratio A-520

Geasa, a magic spell M-34

Geatland (perhaps same as Göta-iand), homeland of 'Beowulf' B-125 Gebal, Lehanon. See in Index Byilos Gebel, or Iebel (yčb'el), Arable word for mountain.

Geber (ga'ber) (Abu Musa Jahir Ibn Hayran) (flourished 776), Arabic scientist; held sound views on chemical research; suggested geologic formation of metals

alchemy A-145 discovers nitric acid N-240 Gehhard, Louis A. (born 1896)

and radar researcher, born Buffalo, N. Y. pulse transmitter R-28

Geck'o, lizard L-283-4, picture L-284 foot, picture F-225 Ged, William (1690-1749), Scottish

Ged. William (1690-1749), Scottish goldsmith and printer, Inventor of a stereotyping process.
Geddes, Sir Eric (1875-1937), British political leader, director general of military rallways and inspector general of transportation during World War I (1916-17); first lord of the admiralty (1917-18).
Geddes, Norman Bei (born 1893), artist, born Adrian, Mich.; known for work in stage and Industrial design; stage sets for The Miracle,

sign; stage sets for 'The Miracle', 'Hamlet'; designs for automobiles, ships, airplanes helped to make streamlining popular model of ocean liner, picture S-428

Geelong (ge-long'), Australia, seaport in Victoria 40 ml. s.w. of Mel-bourne; pop. 44,641; Important woolen trade and manufactures; quarrying: map A-488 Geese. See in Index Goose

Geese, sacred, how they saved Rome R-184

Gegenhaur (ya'yun-bour), Karl (1826-1903), German comparative anatomist; first to study anatomy from evolutionary standpoint ('Comparative Anatomy of Vertehrates').

tive Anatomy of Vertehrates'). Gehen'na, or Valley of Hianom, in Palestine near Jeruvalem J.335 Gehrlg, Henry Loals (1903-41). American hasehall player G-34-5, picture G-35, Ecc alvo in Index Baseball Hall of Fame, table Geiger counter, or Gelger-Müller counter, between for detecting radioter, instrument for detecting radio-

activity R-54a, pictures R-53, E-456 cloud chamber R-32, picture R-31 used in oii-well logging P-172 used in oii-well logging P-172
Geljer (yd'y/r), Erik Gustaf (17821817), Swedish poet, composer, and
historian; professor of history University of Uppsala; wrote stirring
music to his own verses.
Gelkie (ye'li), Sir Archibald (18331924), Scottish geologist, born
Edinburgh ('Story of a Boulder';
'Class Book of Geology')
calculates earth's are E-194

calculates earth's age E-194

Gelkle, James (1839-1915), Scottish geologist, born Edlinhurgh; brother of Sir Archibald Geikle ('The Great

of Sir Archibata Geikie (\* Ane Geikie Arce').

Geikel, Theodor Seuse (born 1904).

pen name Dr. Seuse Hilbstrator and author of hooks for children; born Springfield, Mass, Children's books include 'And to Think That I Saw It on Mulberry Street', '500 Hats of Bartholomew Cubblus'. 'Thidwick: The Big-Hearted Moose', and 'Horton Hatches the Egg'. Wrote scripts for motion pictures 'Gerald McBoing Bolng' and 'The 5000 Fingers of Dr. T..

Geissier (fis'lkr), entertainers, in Japan J-302, D-14/-9

Geissier (fis'lkr), Henry (1814-79), German maker of scientific instruments; Gelssier tubes named for him.

Geissier tube, a sealed glass vessel containing rarefied gas and electrodes between which high-voltage

containing rarefied gas and electrodes hetween which high-voltage electricity is passed, causing the gas to glow brilliantly; used principally in spectroscopy. X-328 glowing explained E-318

Gel, in colioid chemistry C-385 Geinda baboon B-2 a proteinlike Gel'atia, or gelatine, a proteinike jelly of unknown chemical compo-sition G-35

colloidal nature C-384, 385 effect of potassium Lichromate C-301 glue a form of G-127 photoengraving processes P-210b photographic plates, films P-221 photograture process P-210c protein in bones B-145 seaweed yields S-95

Gelding, an unsexed male horse H-428 Gelee, Claude. See in Index Claude

Lorrain Gellbolu, Turkey. See in Index Galilogii

Gelou (gë'ion) (died 478 B.c.?). Greek eion (gc:101) (died 478 E.C.?), Gress leader, succeeded Hippocrates as tyrant of Gela, Sicily (491 EC.). Syracuse, of which he hecame trant about 485 E.C. attained great power and riches under his rule, defeated Carthaginians 480 E.C.

Gelsemlum (gel-sc'mi-vm), or Caro linn yellow jasmlue, a smooth twining shrub (Gelsemium semperrirens) of the logania family with opposite shining lance-shaped

ienses and small fragrant funnel shaped flowers in axillary clusters rootstock yields drug getsemi in used in Irrating neuralgia convut slong and bronchtils flower of South Caroffna. color picinie S 384a

iesenbleehen (gel zun birn ifn) Ger wany industriat lown in Ruhr Valley 8 ml ne of Essen pop 315 480 coat mines from and siech works, chemical n nunfactures map 1 sel C 35 emara (ge mara) part of the Tal

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b ghest range in ardinia near center of island h ghest point 50 0 ft Gennes aret Take or Sen of In fex Calline Sea of Ser fi Grans (gel o n) fiallen Genorn (ge

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u-French : German u gem go làin then u-French nasal (Jean) ah-French ; (2 in azure) K-Cerman guillural ch

Mediterranean in n.w. Italy, with city of Genoa at its head; broad southern portion known as Llgurian Sea · map I-262 Genocide (from genos, meaning race,

and  $cid\epsilon$ , meaning killing)

and cide, meaning killing)
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Genova, Italy Ser in Index Genoa
Gener (zhān'rā) painting P-38
Geuro (gen'rō'), in Japanese gove'nment the unofficial body made up
of elder statesmen who formerly
advised the emperor J-320
Genseric (gen'gr-ik'), or Gaiseric
(AD. 3902-477), Vandal king; conquered n. Africa including Carthage
(429-429): plundered Rome (455):

(429-479); plundered Rome (455): V-437-8 Gent, Belgium. See in Index Ghent

Gentian (gra'shan) an autumn flower G-38, pictures G-38, color picture F-176

Gentian, drug G-38 Gentian family, or Gentlanacene (iiin-shi-a-nā'sē-ē), a family of plants and shrubs including the gentians exacum buckbean centaury water snowflake

Gentile (gén-té'lá), Giovanni (1875– 1944), Italian philosopher; minister of education under Mussolini; assassinated

Gentileschi (grin-tē-lrs'l;ē). (1565°-1647), Italian painter, horn Pisa: decorated Interiors of several Pisa; decorated Interiors of several paleces in Rome in 1626 settled in England where Van Dyck palnted his portrait palntings vivid in color but lack composition, his best works 'Moses Saved from the Waters' 'Annunciation.' Joseph and Potiphar's Wife' His daughter, Artemisia Gentileschi (1590-1642), horn Rome became popular ter. Artemisia Gentileschi (1890-1642), horn Rome became popular in England as a portrait painter and equaled her father in historical painting ('Judith and Holofernes'; 'Christ among the Doctors'). 'Gentle Art of Making Enemies, The', a look of satire and wit directed against his critics by James Abbott McNelli Whistler W-121

Gentlemen's agreement, an agreement entiemen's agreement, an agreement binding only as a matter of honor and not legally enforceable, as he-tween business rivals (to fix prices or standardize sales methods) or between nations

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Georgian (1852) In realow Bradles. James Bradles. Geode (ge'od). In geology R-169

Geod'esy, measurement of the earth or large portions of the earth's surface S-457 Gendet'ic surveying. surveying which the curvature of the earth is

taken into account S-457, 458 U. S. Coast and Geodetic Survey Geodnek (ne'o-dul:), or gwedue, a

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Arthurian legends A-394 Arthurian legends A-594 [courter Plantagenet (1113-51), count of Anjou, husband of Matilda (daughter of Henry I of England), and father of Henry II S-390 meaning of "Plantagenet" H-335 Geoffrey

meaning of Figure (2h6-frica-sait-Geoffro)-saint-Hilaire (2h6-frica-sait-ti-ler). Litenne (1772-1844), French naturalist, pre-Darwinian French naturalist, pre-Darwinian believer in mutability of species.

founder of the science of teratology, ar study of mansters.

ogy, or study of mansters.

Geographical distribution of animals and plants. See in Index Ecology Geographical Society, American G-47 Geographic Society, National G-47 Geography G-39-48, map G-42, pictures G-39-41, 43, 45-6, Reference Outline G-47-8. See also in Index Earth; World; the continents, countries, and chief regions by name. tries, and chief regions by name; also topics below by name anclent knowledge G-45-6, P-430 bibliography G-48

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college of arts and sciences, and teachers college.

Georgia Warm Springs Foundation, at Warm Springs, Ga., about 40 ml n.e. of Columbus; established 1926 by President Franklin D. Roosevelt for the treatment and care of persons who have been crippled infantile paralysis. R-201

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Geraint (fi-rant'), Sir, knight in Arthurian legends, hero of Tenny-son's 'Geraint and Enid'. Gerailline (fir'āl-din) the Falt, Lady

Elizabeth Fitzgerald (died 1589), celebrated in some of the earl of Surrey's connets; In late romantic legend, object of Surrey's devotion.

Gera'nium, flowering plant G-82, color pictures F-172, P-286 cutting, how to make, picture P-300 Gernnium family, or Geraniaceae (ge-rā-ni-ā'sē-ē), a family of plants and shrubs, including the geraniums, cranesbill, herb-robert, heronsbill,

alfilaria and storksbill. Gerard (2kā-rār'), François Pascal, Baron (1770-1637), French painter; pupit of David; classical subjects, 'The Three Ages' 'Daphnis and Chioe', historical, 'Battle of Austerlitz'; more than 300 ('Madame Récamier'). portraits

Gerard', Jomes W. (1867-1951), law-

Gerard', Jomes W. (1867-1951), law-yer and diplomat, born Geneseo, N.Y.; ambassador to Germany 1913-17 ('My Four Years in Germany'), Gerberu (gër-bê'ra'), or Gerberlo, a genus of perennial plants of the composite family, native to S. Africa and Asia. The Transvaal dalsy (Gerberla jamesoni) has bright orange flowers high above the woolly leaves; some have white, pink, or red flowers. Gerbert. Sec in Index Sylvester II

Gerbert. Scc in Index Sylvester II

Gerfalcon H-292 Gerhardt (gerfaget), Paulus, or Poul Gerhardt (fir thärt), Paulus, or Poul (1607-76), German hynn writer; considered greatert of his time; strong supporter of Lutheranism; (O Sacred Head Once Wounded'; 'Commit Thou All Thy Griefs'). Gerlatric- (fir-i-āl'riks), a department of medicine which deals with old age and its diseases C-454a, picture C-454. See also in Index Old age

Géricault (ztrā-rē-tē), J. L. A. Théodore (1791-1824), French painter, leader of Realistic school and of re-

volt against David's Classieism. Gericke (jör'ik), William F. (born 1884), plant expert, born Fremont, Neb. P-308-9

Gérin-Lajoie (zhā-rāṅ'lā-zhīcā'), An-toine (1821-82), French-Canadian novelist and poet, born Yamachiche, Quebec; editor La Minerte (Montreal); one of founders and for several years president L'Institut Ca-nadien ('Un Canadien', poem; 'Jean Rivard', novel; 'Dix ans d'Histoire

du Canada').

Gerizim (jer'i-zim or je-ri'zim),

Mount, in Palestine; aeross narrow
valley from Mt. Ebal; 2849 feet,

Germ, the embryo, usually small, in a seed or cgg E-268. See also in Index Embryo; Embryology

Germ. See in Index Mierobe Sir Edward (1862-19361 German. English composer; incidental music for several Shakespearean plays; comic operas ('Nell Gwyn' and 'Merrie England'), symphonies, symphonies, suites, rhapsodies, songs.

German Affairs, Bureau of, U. S. U-358 German Baptist Brethren. See in In-

dex Dunkers German carp. See in Index Carp German cockronell, or croton bug

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German'Icus, Chesar (15 B.C.-A.D. 19), Roman general, nephew of Tiberius; had nearly conquered many when lealousy of many many when jealousy of Tiberius led to his recall and transfer to Syria: allegedly poisoned at in-

stigation of emperor.

Germinium, a gray, brittle, metallic element of silicon family; found in argyrodite and other rare minerals. Discovered 1886 by German chemist Clemens Winkier. In World War II, came into use as crystal rectifier in radar units, later in radios; also used in special optical glass which has high refractive index; tables P-151, C-214

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German Southwest Africa, former German colony. See in Index South West Africa

west Milia Germantown, Pa., former n.w., suburb, now district, of Philadelphia; scene of Revolutionary War battle (Oct. 4, 1777) where Washington's surprise attack against Howe proved unsuceessful: W-77

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German tribes. See in Index Teutonle

tribes German-Volga Republic, Russla, tonomous republic on lower Volga; 10,800 sq. mi.; 1939 pop. about 605,000; people descended from German immigrants; Soviet government transported them to Siberia when Nazis advanced toward Volga during World War II; republic abolished 1941.

German Workers' party, nucleus of Nazi organization H-383, 385

A21 organization H-383, 386
Germnny, a land of central Europe, divided into two countries, West Germany (area 95,867 fq. mi.; pop. 49,732,824; eap. Bonn) and East Germany (area 41,535 fq. mi.; pop. 18,517,567; cap. East Berlin); G-87-104, maps G-88, E-416, 424-5, pictures G-87, 90-102, Reference Outline G-103-4
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Germ | larory of disease D 103-4 M 165 See also in Indea Diecase a thread gern theory

Gérome (2hd ron: ) Jeun 16on (18°1-1904) French painter and sculptor noted for purifical at of historical and

classical scenes ('Gladiators before Caesar'; 'Slave Market in Rome') 'Caesar and Cleopatra', picture C-343 Greek actors, picture D-130

Greek actors, picture D-130 Geronlmo (ge-voin'-mb) (1829-1909), leader of Chiricalua division of Apache Indians, born Arizona, led brutal raids on both sides of Mexican border; surrendered to US, troops 1886; sent to Fort Pickens, Fla., as prisoner of war later trans-ferred to Indian Territory; name used by American paratroopers as battle cry in World War II because

of his surprise attacks. Gerould, Katharine Fullerton (1879-1944). essayist and story writer, born Brockton, Mass. ('Vain Obla-tions'; 'Modes and Motals')

Gerry (ger'i), Elbridge (1744-1814), statesman, born Marblehead, Mass; one of signers of Declaration of Independence; member of Constitutional Convention & Massachusetts 1810-12 Gerrymander named for G-104

signature reproduced D-37 vice-president M-24 'X Y Z' affair X-332 erry, Elbridge T. philanthropist, born (1937-1927) Gerry,

phllanthropist, born New York City: grandson of Elbridge Gerry: founder of the Society for Preven-tion of Cruelty to Children, often called the "Gerry Society" Gerry mander (ger-i-man'der, also

ácr-i-man'der) G-104, picture G-104 Gershwin, George (1898-1937) American composer G-104-5, O-398, pic-

turc G-104 'Porgy and Bess', picture 0-397 Gertrade, Saint (the Great) (1256 Gertride, Saint (the Great) (1256-1302). German Cistercian nun and mystic writer. born Thuringia; patroness of West Indies, festival November 15

Gervals (zher-ve'), Emlle (born 1900), Canadian writer and Roman Catho-

lle priest; won Canadian Book of the Year for Children award 1952 for 'Monselgneur de Laval'. eryon (perion), a monster in Greek mythology H-342 Geryon

Green Honrad von (1516-65), Swiss naturalist, born Zurich: collected plants and animals; his 'Historia Animalium' is often considered foundation of modern zoology.

esnerla (*jēs-nē'rī-q*) famlly, or Gesnerlaceae (*jčs-nēr-ī-ā'sē-ē*) , a Gesnerla family of plants and shrubs, na-tive to the tropics and subtropics,

including African violet, gloxinias, cape-primrose, and episcias.

Gesuler (ŋĕs'lēr), legendary official defied by William Tell T-55

Gesso (ġĕs'sō), in art, a raised ground of plaster for painting or for re-lief form of sculpture; used in mural painting, also in decorating polychromy, used in S-74

Gest (gëst), Morris (1881–1942), Russian-American theatrical pro-ducer, born Vilna; with F. Ray Comstock, 1905, produced 'The Miracle'; hrought Chauve-Souris and Moscow Art Theatre to U. S.; director motion pictures after 1926. estalt (ge-shtalt') P-426-7 Gestalt psychology

influence on education E-247

Gestupo (ỹể-shtű pò) contraction for Geheime Staatspolizei, German se-cret police organized by Adolf Hitler 1933 and headed by Heinrich 1933 and headed hy Himmler 1934-45: G-99

Gesta Romanorum (gcs'ta ro-ma-no'-rum), collection of tales from Roman sources, compiled in Middle Ages; source of plots for Gower, Chaucer, Shakespeare,

Gestation, the period of pregnancy in mamnials; time between conception mamnaus; time between conception and birth during which the young develop, usually in the uterus, of the mother. The gestation period differs with the species and may vary considerably for individual births for the same animal. Typical statements of the same animal. cal gestation periods for some common mammals are: man, 280 days; mon mammals are: man, 280 days; hamster, 16 days; mouse, 21 days; rat. 22 days; rabblt, 32 days; gulnea pig, 62 days; house cat 55-56 days; dog, 63 days; house cat 55-56 days; dog, 63 days; lion, 16 weeks hog, 16-18 weeks; sheep, 21-22 weeks; monkey, 6 months; cow, 9 months; horse, 11 months; cow, 9 months; horse, 11 months; deta (gitta), shoes of Japan J-303 Gethsemme (gith-sim'n-né), garden e. of Jerusalem; scene of Christiagony on night hefore crucifixion; J-336, J-340, pleture J-337 Getters, in light bulbs V-434 Gettyshurg (git'iz-būrg), Pa., bor-

Gettysburg (git'iz-būrā), Pa., borough 35 mi. s.w of Harrisburg; pop 7046: map P-133 Eisenhower farm near, picture E-287f Gettysburg, hattle of (July 1-3, 1863) G-105-6, H-255, maps G-105, C-335 Meade at M-148

Pickett's charge, picture C-330 Getty shurg Address, by Abraham Lincoln G-106

ett; sburg College, at Gettysburg, Pa.; Lutheran; founded 1832; arts and sciences, text 1.-250 Getts sbuce

Gettysburg National Military Park, in Pennsylvania G-106 Geum (gë'um), a genus of perennial

plants of rose family; leaves from root are lobed, those on stems, bractlike; flowers red or yellow, single or double; also called avens. Geyser (61:27) G-106

Geyver (grzer) G-106
Ireland I-10, picture I-10b
New Zealand N-227
Yellowstone National Park Y-337,
picture Y-339
Gezelle, Guldo (1830-99), Flemish
poet, born Bruges, Belglum; edufor 28 years as a curate; his poems, written in the dialect of West

Flanders, are deeply religious.
ezer ( $\hat{g}^{\varepsilon}$ : $\hat{z}^{\varepsilon}$ ), or Gazara, ancient
royal city of Canaan 20 mi. n.w. of
Jerusalem; Important frontier post In Maccabean wars

calendar and potsherd, picture A-179,

Gezlreh, or Gezira (ga-ze'ra), shaped plain between White Nile and Blue Nile in former Anglo-Egyptian Sudan; irrigated from 50mi. lake, created by 2-mi. dam (opened 1926) across Blue Nile, which can flood 2800 miles of canals; after 1939 mostly in prov-lnce called Gezira, or Blue Nile (area 54,775 sq. ml.; pop. 1,779,-756).

Ghadames, Libya. Sec in Index Gadanies

Gharapuri. See in Index Elephanta Isle Glut, or Gut ( $\bar{y}\bar{a}t$ ), town and easis of Sahara in s.w. Libya; pop. 732:

sanara in s.w. Libya; pop. 732: map A-46 Gluts (gōts), in India, landing places at edge of rivers

Ganges B-123 Ghats, two mountain ranges parallel with e. and w. coasts of peninsula

of India, known as Eastern and Western Ghats I-53, map I-54 (thanh (\$\vec{g}\vec{g}\vec{g}\vec{m}\vec{g}\vec{g}\vec{m}\vec{g}\vec{g}\vec{m}\vec{g}\vec{m}\ve and Persia; taken by English 1839 and 1842; seat of medleval Emplre of Ghazni, which rose to its height of power and wealth under reign of Mahmud of Ghazul: map A-33

Gliebers (ge'berz or ga'berz), Gabers, Guebers, Ghavers, name given in Iran (Persla) to followers of Zoroaster: known in India as Parsees. See in Index Zoroaster

Ghee (\$\tilde{g}\tilde{e}\$), semifiuld butter B-364b, B-341 Ghent (gent), Belgium, also Gand or Gent, picturesque city; pop. 166,096; G-106-7, maps B-111, E-416, 424

G-106-7, maps B-111, E-146, 424 altarpiece, 'The Adoration of the Lamb', picture M-465 book trade, medieval D-238 lucemaker, picture B-113

medleval trade center B-115: guild-halls, picture G-228 "Ghent, great bombard of," a cannon

A-400 Ghent, Treaty of, ending War of 1812 between U. S. and Great Britain (1814) W-14, picture M-23 Clay helps draft C-341

Ghent aralea, a hybrid A-542
Gherkin (\$\tilde{g}\tilde{v}^\*k\tilde{\text{in}}\$), type of cucumber used for pickling C-529
Ghetto (\$\tilde{g}\tilde{t}'\tilde{\text{in}}\$), Jewish quarter of a city; in medleval times an urban arales of the control of the control

section where Jews traditionally were required to live; segregation of Jews in ghetto made enforceable hy law under Pope Paul IV in Rome 1555; also enforced in Frankfort. Prague, Avignon, Venlee, and other European citles: gradually abolished in 19th century, but re-established by Nazis during World War H. Ghlbellines. See in Index Guelfs and

Ghlbellines Ghlhertl (ge-ber'te), Lorenzo (1378-1455), Italian sculptor G-107

Baptistery doors G-107, 1-279, S-78a, picture R-105 Ghlizal (fillzi), Afghan race A-31 Ghlordes, or Turkish knot, in weaving R-248

Ghirlandalo (yer-lan-da'yo), Domenleo (1449-94). Italian fresco painter: greatest of a family of Florentine painters; tendency to-Ico Florentine painters: ward realism and individual expre-

sion; scenes from life of St. Francis and 'Adoration of the Shep-herds' (1485) in Sassetti Chapel, St. Trible Civil St. Trinita Church, Florence Michelangelo apprenticed to M-212 Ghostfish. See in Index Wrymouth

Ghost flower, or Indian plpe, a plant pictures F-316, N-50
'Ghosts', play by Ibsen (1881); shows in the life of Oswald Alving the relentlessness of inherited evil, and in the life of Mars Alving that vir-In the life of Mrs. Alving that virtues may become vices when not directed with intelligence and truth.

G.I., abbreviation for government Issue, or general issue, of ciothing and equipment in armed services. In World War II became slang term designating arms of the control o designating army enlisted men and various army practices, such as G. I. haircut, G. I. inspections
G. I. Bill of Rights E-256, T-200b, U-404, table V-466a

Glacometti (ġä-kō-māt'tē), (ya-ko-māt'te), Alberto (horn 1901), Swiss sculptor, born Stampa, near St. Moritz: S-83 Glacosa (ġā-kō'zā), Gluseppe (1847-1906), Italian dramatist chief works 1-260

chief works I-260 Glambologna, See in Index Bologna,

Giovanni da Glannini

Giovanni da lannlni (gā-nē'nē), A(madeo) lannlni (gā-nē'nē), hanker, born of lmmlgrant parents at San Jose. Calif.; In 1904 organized at San Francisco, Calif., the Bank of Laly which grew into the Bank of America National Trust and Savings Association (a state-wide banking creater with more than 500 system with m branches in 1953) more than

la circue C 514-15 picture C 312 Clent in myth and story Cyclops C 533 Giani Despair in Pligrim a Progresa

Gulllyera Travels C 229, S 470 Norse invihology O 340 Promelheus P 117

7itane & 105 Clent erberviter See In Index Westera red cedar

Glant rectus common same of several large cact! especially the saguars C 8 10 picture D 213 color pla-ture C 11 taguaro state flower of Arlzona

color picture S 381a Giac | 1 tay inpla or golden traved chinquaple C-237 Clent clem C 339 S 1395, picture

£ 339 Giail fir grand fir or towlend while fir evergreen tree (Ablee grantie) of pine family native from Vancous vir bland to California and New land Grows 80 ft to 200 ft. Leaves

ions treas some to cook at the with 2 oblong bright green to 4 in iong Someimer called aliver for yellow for western white for and grand while for Markeled as white for

white it alerkeied as white it flant Maustaine also Riesengehiran (resen 5: bir 5:) highest range of Sidelen Mie between Silesia and Lohemia highest print the Schneekopje (1763 ft) Start or name once given to urus

C 141 tie t punds a rare hearlike mammat [Altimpn la melanoleuca] found in highlanda of central Asia pic fore T 25

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6ls t water him or electric light bag. N 65 ft lit c W 64 Clint wheel be a Sec in I idea Aseann buga

Giangi s (ge &L ) William Francis (brn 1892) 1892) American chemist fa tilly University of California ... h s demagnetization mell od enabled erlentists to pro-

dice temperatures within a fet thousandths of a degree (F) of thousandths of received the 1849 obel prize in chemiatry for him a relications of the properties of substances at extremely low term

Chura Se Ghurs. Ree is In lex Johnso | bruit ( hr b5 ) Pierre (1737-1804) oman Celholic missionars Mealreal

hoennes and Cahokia alder George and Cahokia aided George Rogers Clark ly securing freadship of calculus and Indians around Vincennes (1778)

Ches Edward (1737-94) English haberian his Decline and Fall of the Roman Empire le a monument ta work of prodigious learning and bell ant style L 98r

association with Sar asi Johnson L 3780

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1886 burle | in Ball mare B 41 Gibliana se Ogdra in onetitulional

Gibbnin ( / b y maon 31 38e Gibbs Aril or Hamilton (burn 1888) Au ericen auti r All efficient autility is a noncon England brother of Sir Philip Gibbs and C smo linnillton (Gnn Fodder war b ograph). The Honr of Con Soundings Hernesa

novelst 1682-1"54) ibbe Jemen (1682-1"54) English architect influenced by Christopher architect influenced by Christopher Wren hie best wirk includes bt Mary le Strand and St Martin in the Helds London and Rad el ffe Labrary at Oaford Martin in the Fiel in picture

Glube James Pthan Allen (1829-1902) inventor born Laphine Va S 117

Gibbe Hall of Fan e toble 11 240 Fane Idlie Hamilton (bor

187.) British editor wir pondent and now ist or ther of Arthur Hamilt is Gible at 1 C. sno Hamilton (novela The Vidle of the Load on nor the Others The Amazing sunner The Interpre br ther of Entopi Staby) Lrowded Company )

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lambe with deterranean sags
5 310 A 42 E 41s

Gibraliar of He Past Aden Arabia

Cibralian of the Yorth Sea Helgoland

Gibran (# 6-rem) habiil (k:12) thru (f 6.-re x) habiti (k:11) (1853-1931) Syrian American writer and artist born Lebanon came to hee in United Systes in youth wrote fire! to Arabic Later in Englishes beetle and myatt at in lis writings whether in prose or verse and hall symbolical draw lings (The Prophet Secrets of the lings (The Prophet Secrets of the Gibson Charles Dana (1867-1944) Blue rator born lownry Mass el lilful portrayer of society life creator of the Gibson g rl Glbson John (1790-1866) or infroduced color Rritteb a nipior

Blustrator

Greek fashion in tinted Tenns (Sleeping Shephard Vars and Copid statue of Queen Victoria) Glisson Matherine (1911 1813) author of children s books born Indianap o is (Goldsmill of Florence a book of great craftsmen Golden Bird antient levendal

British poet (Stonefolds Border-tands Seighbors depicting inner Gilianu life of working neople!

lifa of working people)
Glisma Desert in e part of Western
Australia ale of exper meni-qi
rokkei range 200 mi wide operated
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Giddings Franklin II (1853-1931)
sociologi i born Sherman Conn pi fessor acciology Criumbia Unt versity (The Principles of Social ogy The S lending Sludy of Hu man Society')

man Society')

Glie (zh'l) André last failleame
(1969-1961) French essayist and
novelisi fine styl at keen psycho
tor cal observer liberal thinker observer liberal thinker 17 Noiel pr za in literajura non 1917 Noiel pr za in literajus famel The Counterfeiters crit clain linginary Interviews Tra vels in the Congo . L Immoralista I 200 Journala)

Gide Charles (1547-1682) French economiat wrote much on co operative movement in France and co operati p ut inieliectual wurkera in different countries.

fild sun rel shous reformer judge and mighty warrior deliverer of Israel from Midanites (Judg Willi) 1 352

J 352 Cideose inputar term for members of the Christian Lommercial Travelera Ars Clatin of America firel group formed 1893 in James lie Wia pul 1-h magazine distribute 7 lies to hotel r one Army Nave and Air Fotos schools impilials pris OBV Ciclaul (fit fid) bir (bribar) Join

iclaul (dildiu) bir (bribar) Jols (born 1994) Lnglish acing di recting and prinducer born London notel as Shakespearean actor outstanding in r le of Hamlet (Eurly stages autobiograph)) Glausking (go 2 kl 19) Walter (born 1893) France of German plate to the following the

pretail n of Debussy Giffard ( he far ) Hearl (162a 83) Leench engineer invented darlyable balloon run by steam B 31

Gir ford Waller Sherman (born 1885) in laurial and civic leader born Salem Mass president Antrican Actenholic and Telegraph Company 1975 18 chairms | Doard of Direct tra 1948-50 director Counc

tre 1943-50 director Council
of National Defense World War
I appointed by President Hoover
hre I r of National Unemployment
Celef 1931-32 US ambassadur to
Jreat Leitain 1940-53 profure 17 387 See also it Index Foundations Gifts and charliles Christman C 294 Boxing Day C 298

ellquette E 107 (lenniepilitéens prehistorie man M 70 Gia headed anipe Ree lu Index

Woodcock Ciali (gel ya) Bestamine (born 1850) Halian dramatic tener hanne lighten dramatic lenor began a with Metropolitan Opera Co., New voice of beautiful York City; quality.

Glgue (zhēg), or jig, a sprightly dance. probably of English origin spreading to continent in 17th century; rhythm typically a multiple of three: derivation thought to be from Italian giga ("fiddle") jix also loosely applied to lively dance with no set pattern, in music, last movement of classical suite Irish jig F-192c

Gijon (hé-hon'), Spain port for rich mining district in center of n coast on the Bay of Biscay, pop 110 985 with suburbs, watering place map E-425

l, Emilio Portes. Sec in Index Portes Gil Emilio

Gila (hč'là) Cliff Dwellings Nntianni Manument, in New Mexico N-35, N-181, map N-18

Gila monster L-283, picture L-283 food in captivity Z-357

Glia River, broad and shallow stream 630 mi long rises in Sicrra Madre in s.w. New Mexico and crosses Arizona to Colorado River maps U-252, 297, A-353, N-179, Sec also in Index Coalidge Dam

Gilbert, Sir Alfred (1854-1934) English sculptor and goldemith (statue of Queen Victoria for Winchester, England memorial to duke of Clarence at Windsor Castle) Gilbert, Cass (1859-1934), one of fore-

American architects horn Zanesville Olno, designer of many buildings the Minnesota Capitol, the Woolworth Building and U S Custom House, New York City, planned University of Minnesota and University of Texas Zapitol. W Va. nicture W.110 Capitol, W Va., picture W-110

Gilbert, Henry Franklin Belknap (1868-1928), composer, born Somerville, Mass; one of the first to emphasize use of Negro inusical idioin in his works

Glibert, Sir Humphrey (1539?-83) English navigator, half-brother of Sir Walter Raleigh; seeking the Northwest Passage (1583), took possession of Newfoundland for Queen Elizabeth I, first English colony in North America (though it lasted but a shart time); lo sea on return voyage: A-190 lost at

Gilbert, Sir John (1817-97), English painter and illustrator; great historic themes of vigarous design and

Glibert, Seymour Parker (1892-1938), llwer, seymour furner (1002-1000), lawyer and financial expert; born Bloomfield, N. J.; assistant sccre-tary of treasury 1920-21; under-secretary of treasury 1921-23; secretary of treasury 1921-23; agent general for reparations payments of Germany, 1924-30.

Gilbert, William (1540-1603), English scientist, called "father of electric science" M-42, E-307

Gllbert, Sir William Schwenk (1836-1911), English poet and dramatist G-108, picture G-108

comic operas O-398: 'Pirates of Penzance', pieture O-396 quated P-334

Trial by Jury' G-108, E-382

Gilbert and Ellice Islands Colony, British calany in Pacific including Ellice Islands, Fanning Island, Ellice Islands, Fanning Island, Washington Island, Ocean Island, Christmas Island, Phoenix Islands, and Gilbert Islands; seat of government an Ocean Island; total area about 200 sq. mi.; pop. 35,824; mop P-16-17. See alsa in Index names of islands

Gilbert Islands, group of coral Islands on equator in mid-Pacific; 166 sq. mi.; pop 27.824; under British pro-tection since 1892; included in Gilhert and Ellice Islands Colony since 1915 map P-16 coconut fiber armor A-376

people P-4, picture P-3 World War II W-263, 288

Gilbert Peak, in Uinta Mts., n.e. Utah (13,422 ft.), map U-416

Gil Bias (zhēl blas), the hero of a famous novel (The Adventures of Gil Blas de Santillane) by Le Sage. Serving 15 masters he travels through Spain having many adven-The book imitated the Spantures ish picaresque, or rogue, novel.

Gliban Dum, in New York A-283

Glibaa, mountain range in Palestine, scene of hattle in which Saul and Jonathan were slain.

Glid. See in Index Guild

Glider, Richard Watson (1844-1909), poet and editor, born Bordentown, N. J ('Five Books of Song') sonnet P-336

Gildersleeve, Virginin Cracheron (born 1877), educator, born New York City; professor of English at Barn-College 1900-1911 and dean 1911-47, known for work in broadening women's higher education.

Gliding, use of gold leaf G-133-4 hookhinding B-240, picinre B-241 sculpture W-190b

Glicad (fil'c-ad), mountainous region in ancient Palestine, e. of Jordan River and s. c. of Sea of Galilee: spices, myrhh, and balm.

Gilead, halm af. Sec in Index Balm of Gilead

Glies (fils), Saint (died 712?), patron-saint of beggars and cripples; hermit and Benedictine ablot of France; festival September 1.

Gligni, ancient city in Paicstine in Jordan Valley between Jericho and river, where Israelites first en-camped after crossing the Jordan (Josh, Iv).

Glignmesh (ğil'ğa-mésh), legendary king of Babylonia, hero of an epic poem written on clay tablets, found in the rulns of Nineveh: B-7

Gilla (gil'i-q), a genus of plants of phlox family, found in western N. America: leaves lance-shaped or finely cut; flowers funnel-shaped or saucer-shaped in thimblelike heads. saucer-snaped in thimmenice neads. Thimble flower (G. capitata) has lavender blue heads; used as an everlasting; standing-cypress (G. rubra) grows to 6 ft., leaves needlelke; birds-eyes (G. tricolor), flowers bell-shaped, violet, shading brownich-numbe to vellet. brownish-purple to yellow.

Gill (gil), Erlc Rawland (1882-1940), English sculptor and stone carver, English sculptor and stone carver; work reflects a decply religious spirit; famous for carving of 'Stations of the Cross' in Westminster Cathedral; wrate on esthetics Cathedral; wrate on esthet ('Beauty Laoks after Herself').

Gill, Slr David (1843-1914), Scottish astronomer, born Aberdeen; director of observatory, Cape of Good Hope 1879-1907; ploneer in using photography to catalog stars, par-ticularly in vast survey of southern heavens 1885–1900.

Gill (gil), a unit of liquid measure, table W-87

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Gillespie, John Birks (Dizzy) (born 1918), Negro jazz trumpet player and bandleader, born Cheraw, S. C.; exponent of "hebop" niusic.

Gillette (gi-lel'), William (1855-1937), actor, stage manager, and playwright, born Hartford Conn.; did notable work in 'The Admirable Crichton' and 'Dear Brutus'; most famous as actor in his own dramatization of 'Sherlock Holmes'; also wrote and acted in 'Held by the Enemy', 'Secret Service'; promoted naturalism on American stage Hilictte Castle at East Haddam

Gilictte

Gilliflower. See in Index Stock; Wallflower

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Gillat (gil'ot), Jaseph (1799-1873), English pen manufacturer P-116

Gliman, Charlatte Perkins (1860-1935), American writer and lec-turer on labor and feminism ('Woman and Economics'; The

Crux'; 'His Religion and Hers').

Gliman, Daniel Cait (1831-1908),
scholar and educatar, born Norwich, Conn; president of University of California and first presi-dent of Johns Hopkins University and of Carnegle Institution of Washington.

Glimnn, George T. See in Index Great Atlantic & Pacific Tea Company

Atlantic & Pacific Tea Company Gilmao, Lawrence (1873-1939), nusic critic and author, born Fluxling, N.Y.; on staff of Harper's Weckly 1901-13, North American Review 1915-23, New York Herald Tribune 1923-39 (Music and the Cultivated Man'; Toscanini and Great Music'). Gilman, Nicholas (1755-1814), political leader, born Exeter, NH; delegate to Congress from New Hampshire (1786-88); to Constitutional Convention (1787); signed the Constitution of the U.S.; Federalist member of Congress (1789-97); Jeffersonian Republican senator (1804-14). (1804-14).

Gilmore, Putrick Sarsfield (1829-92), American bandmaster, born Ire-land; musical conductor at National Peace Jublice 1869, and World's Peace Jublice 1872; leader of famous 22d Regiment Band, New York Cities constitutes unrate music York City; sometimes wrote music under pen name Louis Lamber:

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palm Ginger family, or Zinglberaceae (zin-gi-bēr-ā'sē-ē), a family of plants including the ginger, shellflower, spiled for currents cardened and spiral flag, curcuma, cardamon, and the ginger lily.

fabric usually Gingham, a catton fabric usually woven in checks, plaids, or stripes.

Ginkgo (ğingk'ğō) family, or Giokganceae (ğingk-ğō-â'sē-ē'), a family of trees consisting of trees consisting of trees. af trees, consisting of one genus, native to e. Asia, comprising the ginkgo tree: G-109, T-184, 185

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Glinel in Bohamia

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ITUS) Italian painter born Napice planted with astonishing speed colled 'Fe Freeto' (Christ Ft prints) and Traders Francis Xavier Judgment of Peris) lavians Emberia (1867 1949) Its ian composer pupil of Verdi (Andrea Christer Fedora Vis Glardano

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early disciple of Georg Brandes
wrote The Disciple of the Teutons
an antitheological work under his
historical Influence later works showed spiritual and ethical strain shared

Nobel prize 1917 with Pontoppldan Jéa (yú č) P 550-350a Amundsen a chip

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(1911) one of first cubiets (stores bootland gien 60 min in the stores bootland gien 60 min in the stores bootland gien 60 min in the stores of histogram (stores his property). The stores of histogram (stores his property) and histogram (stores his property) and histogram (stores his property). The histogram (stores his property) has histogram (stores his property). The histogram (stores his property) has histogram (stores his property).

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Alleri a of the family Generia
cece large bell shaped flowers cece large bell shoped flowers of velvely red purple whith or in termed are shades garden plant known as glovinia is of genue

Sustingla Sustingla En mingia buik (gl k) Aima (1886-1938) American drimalle seprano born I umanta allained operatic and otherer success with ul E inpean Irain on became wife f Pfrem

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corn product, diagram C-483 formula, diagrom 0-424b soapmaking S-211, 213

Glyceryl residate, a resin P-41 Glycine, an amino acid O-424c Glycogeo (#li'kō-gen), animal starch G-127, L-277, B-146 muscle fuel B-146, R-118

Glycols, generic name applied to di-

hydric alcohols G-127 Glyptodoot (Greek, "fluted tooth") extinct armadillolike animal of South America; about size of ox; strong legs, short broad feet, and deeply grooved teeth picture M-61

G-men U-362, F-48

fond (ndt), name generally applied to any very small two-winged insect; also part of common name as in eye gnat and turkey gnat Sec also in Index Buffalo gnat, Fungus

Gnateatcher, a bird 12-46

Guelss (nis) laminated granitelike rock M-266, G-57, R-169, pictures G-50, R-168

Gnetales (ne-tables), order of gymnosperms T-185

Gnomes, or kololds F-11 cobait named for C-372 Scandinavian Tomte C-294a Gnomoule (nō-mon'ık) map projec-

tion M-87, 88 navigation N-76

natigation 3-10 Gnosticism (nosticism (nosticism (nosticism), movement in Christian church of 2d and 3d centuries; combined elements of Christian Jewish, Greek, and Oriental philosophies; held knowledge of the held from residents not edge obtained from revelation, not falth, is key to salvation.

Gnu (niv), or wildebeest (icil'du-bëst or il'du-bëst), a member of the antelope family; found in Africa: both male and female have curved horns; head and neck resunble buffalo; has stiff mane and long, ble bilitalo; has sun mane and long, coarse tail; average height about 4½ ft.; sometimes called "horned horse": picture A-263
'Ape Riding a Gnu,' by Baryc, pic-

ture S-79 "Go, tell the Spartage" P-159

Goa (go'a), largest of the possessions comprising Portuguese India; on w. coast of India about 250 mi. s. of Bombay; over 1900 sq. ml.; pop. 547,703; conquered by Albuquerque in 1510; contains Panjim (New Goa), capital of Portuguesc India:

Go obont. Sec in Index Nautleal

terms, table
Gout G-128-9, pictures G-128 altitude range of Perslan wild goat,

picture Z-362 Cashmere goat G-129, picture C-356 ibex I-1-2, pictures I-1 leather L-150, G-126 mllk M-253, G-128-9 ruminant R-254

sheep related to G-128, S-136

Goat. See in Index Capricornus Goat, Rocky Monotain, an antelope A-262, color picture N-259 Goat antelopes. See in Index Moun-

tain goats

Goatfish, or surmullets, family of moderate-sized shore fish (Mullidne) with flat, oblong body, large scale and a pair of chin harbels for digging worms; Inhabits warm seas; superior food fish; color, gold or red.

Goat Island, in Niagara River N-230, picture-map N-231

Goat milk M-253, G-128-9

Goatsbeard, a blennial plant (Trayopogon prateusis) of composite famlly, native to Europe but common wildflower in North America. Belongs to same genus as the vege-table salsify. Grows to 3 ft; leaves gray-green grasslike. Flower heads pale yellow 21 in. ncross; seeds form a round feathery mass, similar to dandellon, sometimes called meadow salsify.

Goatskin L-150 parchment B-232

Goatsucker, family of birds (Caprioulgidae), includes nighthawk and whippoorwill.

Gob. slang term for an American sailor; originated in World War I Gobella (gob-lan') tapestries, amous French tapestries made in Paris, so named from a family of dyers by name of Gobelin who dyers by name of Gobelin who owned bullding in which tapestry industry was established in 16th century, industry now maintained by French government T-14

Gobl (qo'be) The, desert region in central China, 500 000 sq ini., elevation 3000 to 5000 ft M-342-3. vation 3000 to 5000 ft M-342-3, maps C-259, A-406, 411, M-343,

D-73a

exploration E-454

Goblet cells, in stomach, diagram D-91a

Goblins, in folklore, grotesque fairies similar to gnomes and kobolds; they are sometimes evil and malicious and sometimes only playful and tricky.

Goby, any of numerous, widely dis-tributed, spiny-finned fishes con-stituting family Goblidae, having wide, flat head, large mouth, and ventral fins often united in funnelshaped disk; small and usually marine; some species very small estivation F-107

mudskipper, or skipping goby M-444, 445, F-102, picture F-102
Philippine goby F-100
Godard (\$\tilde{g}6\text{-}dai'\$), Benjamio Louis
Paul (1849-95), French composer; works for orchestra, violin, piano, songs, chamber music, operas ('Joceiyn')

Godavari (gō-dāv'ā-rē), large rlver in s. India; rlses n.e. of Bombay in Western Ghats, flows 900 mi. s.e., cntering Bay of Bengal by 7 mouths; navigable for 300 mi.: I-53, maps I-51, A-407

Goddard, Henry Herbert (horn 1866), American psychologist, born Vas-salboro, Me.; authority on feeble-mindedness; researcher, lecturer, writer; most widely known study Walliat Employment Kallikak Family': professor of ab-normal and clinical psychology, Ohio State University, 1922-38, emeritus after 1938.

Goddard, Robert Hutchlogs (1882-1945), physicist, born Worcester, Mass.; physics professor Clark University after 1919; noted for re-search in rocket propulsion, especially in rocket method for reaching great heights: S-309a

Godden, Rumer (Mrs. James Haynes Dixon) (born 1907), English author, playwright, poet, born author, playwright, poet, born Sussex, England; educated abroad and in England; lived in India, then returned to England. Her then returned to England. Her books for adults include the novels 'Black Narcissus', 'The River', and 'Kingfishers Catch Fire'. For chli-dren, 'The Dolls' House' and 'The Mousewife'. She is also the author of the poem, 'In Noah's Ark'.

Gode'tla, a genus of ornamental herbs of the evening primrose family; chiefly hardy low-growing annuals (Godetia grandiflora); has numerous pink or crimson flowers.

Go-devll, pipeline cleaner P-178 Go'dey, Louls Antoine (1804 (1804-78), American publisher of first woman's periodical in U.S., Godey's Lady's Book, Philadelphia (1830-77).

Godfrey, Arthur (born 1903), radio and television entertainer, born New York City; served in Navy, Coast Guard, and Naval Reserve; graduated from Naval Radio val Radio School, Great Lakes Ill., 1921; popular in radio and television. Godfrey, Thinmas (1704-49), mathe-matician, and astronomer, born

Philadelphin, Pa. P-140 odfres of Boullinn (bo-yóñ') Godfrey of (1060?-1100), leader in First Crusade, and first Christian ruler of Jerusalem: hero of Tasso's 'Jerusalein Delivered': C-519, 520, picture M-238d

M-238d
Gndhavn (qōd'hār-n), settlement in w Greenland; pop 319; map N-250
Godlyn (qōd-dī'va), Lady (11th century), English heroine C-502
Godkin, Edwin Lawrence (1831-1902), American journalist and author, born in Ircland; editor of Nev York: Evening Post and The Nation; opposed political corruption.
Godless, Society of the Milliant, Russian Communist organization R-272
Godman, John D. (1794-1830), phy-

sian Communist organization R-272
Godman, John D. (1794-1830), physician, anatomist, and naturalist, born Annapolis, Md.; taught anatomy, physiology, and surgery; one of first in America to prove that ether vapor had anesthetic power ('Anatomical Investigations'; 'American Natural History'; 'Mam-'American Natural History'; 'Rambles of a Naturalist').

Godolphin Arabian, horse, foundation sire of Thoroughbred Horse H-428d.

table H-128c dowsks (40-d6r'skc). (1870–1938), Russia Godow 4ks Russian-American planist and composer, born Vilnius (Wilno), Lithuanla; studied under Salnt-Saëns: extensive concert Saint-Saëns: extensive concert tours; director plano department Chicago Conservatory, 1890-1900; director Master Plano School of Imperlai Academy, Vienna, 1902-12; ln U. S. after 1912; paraphrases of Bach, Chopin, Johann Strause;

many original compositions many original compositions oloy (yō-doi'). Manuel de (1767-1851). Spanish duke of Alcudia and prince of the Peace, favorite of Charles IV and his queen; dom-lnated Spain during the king's Godoy

reign. Gods and goddesses, in mythology, Reference-Outline M-476-9

\*\*Forence-Outfile M-448-9 (God Save the Queen', British national song N-40 Godthaab (got'hôp), capital of Greenland; on s.w. coast; pop. 1021; may N-050 N-250

Godinov, Boris. Sec in Indea Boris

Godunov God'wln, Mory Wollstonecraft (1759-97), English women's rights advo-cate: wife of William Godwin; mother of Shelley's wife, Mary A Vindication of the Rights of

'A Vindication of the Rights of Women' W-184, E-379 Godwio, Parke (1816–1904), journalist,

essayist, and editor, born Paterson, N. J., for years with New York Evening Post; compiled two biographical encyclopedias; wrote 'Out of the Past'; 'Vala'; 'Political Essays' says'.

William (1756-1836), Eng-Godwin. lish political writer, novelist; radi-

rai believer in freedom power of reason (Inquiry concerning Politi cai Justice) \_\_married Mary Woll reven (Ingular conversions) power of the conversion of the convers

peak in Karakorkim Renge of n hashmir probably exceeded in height only by Mi Everext ellitude 2010 it named for Deal she go ogist Henry Haversham Godwin Ausien (1834 is 3) first climbe 1 by Havan expedition led by Ard io Deelo summil reached on July 10

1954 height emmparative See in Index Hounistus table

Southing earl of Bennex (die? 1053) host powerful man in Britain of his day favorite of Canute helped rates Edward the Contensor to Eng sh threne

Seduli chore bird of family Scole canii enore bird of ramily coole pacific the marbled godwii (Lt mosa fedoa) is about 18 inches long ranges from a Aberts e Maltoba, and South Dikots to Maditoba, and court Diagons to Equator and Feru another species is the Hudvonlan godwii (Limoso hasmarita) it grows to be 15 fachse long ranges from Arctle inches long ranges from Areth-regions of North America to Chie

Argenia of total America to Chile Argenia Patagnia and the Fakkand fakandy S 209 bebbela (fakb bele) B sul Jeweph (1887 1945) German Nazi Jeader hinister of propaganda after 1933 committed suloide G 28 H 385

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Coldbeeree Midbeence Joseph (1874-1929) Amer run publir health official and medical research worker Austria Hungary emigrated to New York City in 1850 surgeon in I S Public Health Service 1912-29 discovers tellagra preventive V 498

Gold cerificates paper money M 357-

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Gol len Ass (Latin De Asino Aureo)
eatirical romance by Lucius Apule lus concerns the sdrentures of one Lucius who is transformed into an ass thus disgn sed he observes the preposierous behavior of mankind until enlightened by his experi ences he emerged a new man alory includes the well known fairy

tale Cupid and Psyche Taile Cupid and raylor Golden sater A 426 Fortain Left See in Index Forsythia Golden Smugh The See in Index Frazer S r James Otorge

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mandments (Exod xxxII) M 398

bets (#6E) Vincent van (1853 90) 1. French a German & gem do thin shen a French nami (Josa) 24 = French f (2 in 22010) x = German gustural ch Goldenchain, a tree. See in Index Laburnum Golden Circle, Knights of the C-337 Golden-crowned Linglet K-46

Golden digger, a solitary wasp (Ammobio ichneumonea); stores grasshoppers in underground nest to feed W-52, color picture larvae: W-51

Golden eagle E-167-8 speed in flight B-156

Golden eardrops. Sec in Index DIcentra

Goldeneye, or whistler, a diving duck; two species, the Barrows (Glaucianetto islandica) and the American clangula): (Glaucionetta picture D-160

nest D-158 Golden Fleece, sought by the Ar-

gonauts A-338

Golden Fleece, Order of the order of knighthood in Austria and Spain: membership limited to 24 knights exclusive of sovereign independent branches in Austria and Spain after

oranches in Austria and Spain after 1700; Austrian order discontinued 1919, Spanish 1931: A-338 Golden Gate, channel about 2 ml. wide, entrance to San Francisco Bay S-41, maps C-26, inset C-34, picture

bridge B-308, pictures B-310, S-41. See also in Index Bridge table Golden Gate International Exposition,

at San Francisco (1939-40) S-41a. pictures F-11

Golden Gate Park, San Francisco S-41a Golden Gloves Tonrnament B-270, Golden Gloves T pictures B-268-9

Golden glow, a perennial plant of the genus Rudbeckia of the composite family with showy yellow or orange flower heads; also called flower.

Golden ground beetles, picture B-105 Golden Hill, battle of, in New York N-214

'Golden Hind', Drake's ship D-128 Golden Horde, Tatars who overran Russia in 13th century M-345 effect on Russian literature R-294

Golden Horn, harbor of Istanbul I-258, map 1-258, picture I-259 Golden Horn, ha Siberia V-499 harbor of Vladivostok,

Golden-leaved chinquapin, or giant chinquapin C-287

Golden Legend, The, ecclesiastical work of 12th century by Jacobus de Voragine in 177 sections de-scriptive of saints' days in Roman calendar.

Golden mean, in philosophy G-202 Golden Militia, or Golden Spur, Order See in Index Order of Golden of. Se Militia

Golden moss. See in Index Stonecrop Golden plover P-321

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Golden retriever, dog, color picture D-112, table D-118

Goldenrod G-135, picture F-181, color pictures F-176, S-3840 Golden Rose, a papai honor D-43

Golden Rule, saying of Jesus: "Therefore all things whatsoever ye would that men should do to you, do ve even so to them: for this is the law and the prophets" (Matt. vii. and the prophets" (Matt. vii, 12). Similarly stated Luke vi, 31.

Goldenseal, or orangeroot, a low perennial herb (Hydrostis canodenlow sis) of the crowfoot family, with thick, yellow rootstock and hairy stem terminated by a single greenisb-white flower; used in medicine. Golden State, popular name for Cali-

fornia C-25 olden T-angle. burgh, Pa. P-274 section of Pitts-Golden

Golden trout T-193 Gnillen wattie, an acacia tree in Aus-

flower, picture A-475 Golden-winged wnodpecker. See in

Inder Woodpecker
Goldheld, Nev. mining town; had
great boom in early 20th century;
N-126, maps N-133, U-252

Goldfinch (popular name wild canary)

G-135, pictures F-68, color pictures B-184, N-44 eggs G-135, color picture E-268a nest G-1°5, B-172

state bird, table B-158 Goldfish G-135

Goldish G-135, P-185
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shubunitin, picture P-183
Goldie, John (1792-1886), Canadian
botanist, born Ayrshire, Scotland;
sett'ed in Canada 1844; a fern which he identified. Aspidium goldianum, was named after him

was named after him foldling, Lonis (horn 1895). English writer, born Manchester; inveter-ate traveler (Sorrows of War, 'Prophet and Foo!', verse; 'Sun-ward' (Sicilian Noon', 'Those Ancient Lands', travel books; 'Day of Atonement' 'Magno'ia Street', 'Mr Emmanuel', novels; 'The World 1 Knev" reminiscences).

Gold lace G-134

Gold lace G-134

Gald tent G-133-4

making, picture G-134
Gold leaf electroscope. Sec in Index Electroscope

Goldman, Edwin Franko (horn 1878). conductor and composer, born Louisvine Kv organized Goldman band, New York City, 1918: B-46c Goldman, Emma (1869-1940). Amer-

oldman, Lmma (1802-1849). Ander-lean anarchist, born Russia; co-publisher of Mother Earth, an-archist monthly; deported from United States to Russia, 1919; left Russia ahout 1921; died in Toronto, Canada and buried at her request, In Chicago, Ill., heside comrade anarchists of Haymarket Riot of 1886 ('Living My Life'). Gold'mark, Karl (1820-1915), Aus-

composer, horn Hungary unta'a'. 'Penthesilea', 'In trian ('Sakunta'a', 'Penthesilea', 'In Springtime', comnositions for or-chestra; 'Queen of Sheba', 'Cricket

on the Hearth', operas).
Goldmark, Peter Carl (born 1986). American engineer, born Budapest: chief television engineer Columbia Broadcasting System 1936-44: director engineering research and development, from 1944; invented a method of color television (demonstrated 1940).

Goldmark, Rubin (1872-1936), com-Goldmark, Rubin (1872-1936), composer and teacher of music, born New York City, nephew of Karl Goldmark ('Samson', symphonic poem; 'Hiawatha', 'A Negro Rhapsody', overtures).

Goldoni (gōl-dō'nē), Carlo (1707-93), Italian dramatist, founder of modern Italian company. The Coffee

ern Italian comedy; "The Coffee House' and 'Pamela' are his best; The Coffee also wrote plays in French

Gold point, in economics F-235 Gold rush

Alaska and Klondike A-137, Y-348 British Columbia B-316-17 California S-2, C-47-8, D-26, pic-fures C-47, G-132 Colorado C-401, 414, D-73

Nevada N-126

Nevaua N-126
Goldsboro, N.C., commercial center in fruit, grain, and cotton region on Neuse River, 48 mi. s.e. of Ruleigh; pop. 21,454; cotton yarn, cottonseed and soybean products, furniture, brick: map N-275
Goldschmidt (jöll'shmil), Hans (1861
-1921) Carman chemist hord Eer-

-1923). German chemist, born Ber-

In: developed aluminothermic, or Goldschinidt's, process, in which powdered aluminum is Ignited to reduce various metallic Goldschmidt's process applied also to thermite welding.

Goldschmidt, Jenny Llnd. See in In-dex Lind, Jenny

Gold Seal Award, in children's literature L-267

Goldsmith, Oliver (1725-74). English novelist, essayist, and poet G-135, E-378b, picture G-135 children's books L-269-70

puppet story P-440 Samuel Johnson and, picture C-459

Goldsmith leetle, large yellow noc-turnal beetle (Cotalpa lanigero) similar to common dung beetle; common in e. U. S.; fond of willow trees; name also applied to other species of the suhfamily Rutelinge. Goldsmithing. See also in Index Metal-

work Byzantine reredos, St. Mark's B-374 Gold standard, use of gold alone for monetary standard, as opposed to

use of gold and silver or of irredeemable paper M-339 adopted in U.S. (1900) M-19 himetallism M-338 Bryan opposes M-18, B-334 foreign exchange F-235 franc stabilized F-270

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"Specie Circular" (1836) J-287 supported by: Cleveland C-345;

Hayes H-298 suspended in U.S. R-207 Guld Sfur, U. S. Navy D-38 Gold Stur Mothers. See in Indez

American Gold Star Mothers

American Gold Star Mother's Day 7-58
Gold Star Wires of America, Inc., a
patriotic organization of wives
whose hushands were killed in
World War II and the Korean conflict; founded 1945; headquarters. Washington, D. C.

Goldstein, Eugene (1850-1930), German physicist, professor at Univer-sity of Berlin; discovered "canal rays" or positive rays.

Goldstone, or avertarine, a semipre-clous stone J-349
Goldstoned, a low perennial herb (Coptis trifolio) of the crowfoot family having evergreen leaves and small white or reliew flowers: a small white or yellow flowers; a tonic medicine is extracted from its bitter root, also a yellow dye.

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lure king's College University of many Old and Middle 1 nailsh levis and authority on Shakespeare Goischmeile Vialimir (born 1893) Franco A nerican musical conduc-lor form faris founded Gal-schmann Orchestra Paris becama conductor St Louis Symptony

Orchestra 1934 Colpunt hiron (1843-1916) Prussian field marshal

asi military writer reorganized asi military writer reorganized Turkich army 1881-95 governor general of Belgium 1914 com manded Turkich army in Mesopo tamia 1915 16 (War Hislory of Germany in 18th Century The Nallon in Arms ) Genel Rutels manufacturing and railroad to ler and river port on branch of Unieper River \$50 mt

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Lér'iè da) (Gassale Herandez y awr (o ou) 1601 role Hernandez y Laollar) (14537-1513) Spanish general whose many ross ests rada him famous throughout From account Frope secured possession of happen to spain but I at popularity L Lone

with king tan and close of he life ning in invertify at spokane. Wash Ronan Cahotic of and 1889 arts and aclences husiness administration eng neering 19.79 music nurs ax graduate studies (sintales (pos stil at Mon et (1833-

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high surface ordered for reorax he bigle Capital conceived design not only impressive but unique

not only impressive but unique among bu felinar of this type Good blors Robert title types to Goodman Brace of Scotland B 336 Goodman Beanny (born 1993) clari petict orchestra conductor born

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1871) class oil Greek and Biblical scholar both Quincy in professor at University of Chicago 1898-1897 with J. M. S. Smith Leansiel of the Market of the Chicago 1898-1897 with J. M. Story of the New Testament Problems How to Ryad the Bibliah Goodspeed same of one of ships in which first Jamestown Combulate first Jamestown Combulate Greek Templare international Orders of Conditional Computational Computati

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Goose step, military step of Germany, picture G-99 Goose with the Golden Eggs, The',

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scene of cutting of Gordian knot: Gordon, Adam Lindsay (1833-70), one of most popular and distinctive of Australian poets, born Fayal, island of Azores A-493

Gordon, Anna Adams (1853-1931), temperance worker, born Boston, temperance worker, born Boston, Mass.; secretary to Frances E. Willard 21 years; president International Woman's Christian Temperance Union ('Songs for Young Americans'; 'Life of Frances E. Willard': 'Toots, and Other

E. Willard': 'Toots, and Other Stories', for children').
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fordon, Lord George (1751-93), Eng-lish agitator, born London; headed anti-Catholic movement which re-sulted in Gordon riots of 1780.

Gordon, George Angier (1853-1929)

American Congregational minister, born Scotiand; pastor, Old South Church, Boston, 1884-1929; univer-sity preacher to Harvard and Yale universities.

Gordon, John Brown (1832-1904) Confederate general, later governor of and senator from Georgia; born Upson County, Ga. Civil War; author Ga.; lecturer on thor of 'Reminiscences of the Clvil War'.

Gordon, Judnii Loeb, or Leon (1630-92), Russlan-Hebrew writer, born Wiino, Lithuania; called "poet Wilno, Lithuania; called "poet laureate of the Haskalah" (move-ment for Jewish enlightenment); lyrics, satires.

fordon riots, precipitated in London on June 2, 1780, by a mob led by Lord George Gordon; caused by ob-jections to repeal in 1778 of Catholic penal laws; Roman Catholic

Roman chapels and houses of magistrates burned; Newgate prison wrecked and prisoners liberated. Gordon setter, a hunting dog, color picture D-113, table D-118
Gords. Wilbur Fisk (1854-1920).

Tisk (1854-1920). educator and historian, born near Salisbury, Md. ('A School History of the United States'; 'Colonial 'Colonial Days'; 'Leaders in Making America'). Gore, Francis (1769-1852), lieutenant governor of Upper Canada 1806-17;

governor of Upper Canada 1800-11; born Kent, England. Gore-Booth, Eva (1872-1926), Irish author; well known for 'The Perilous Light' and other poems; in poetic drama 'The Death of Fion-avar' she pleaded for peace ('House of Three Windows'; 'Shepherd of Exemity') of Three Eternity') Gorgas (gor'gas). William Crawford (1854-1920). U.S. Army officer and sanitary engineer G-142-3, pic-

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Gorgonzola (gor-gont-so'la), town in Lombardy, Italy, center of cheese-producing district. Gorgonzola cheese C-206 Gorham, Nathaniel (1738-96), busi-

orham, Mathaner the Artesman, born nessman and statesman, born Charlestown, Mass.; member of Continental Congress 1782, 1783, and 1785-87, president 1786; signed United States Constitution.

United States Constitution.

Gorilla, the largest of the apes G-143, pictures G-143, Z-357, A-271
hand, picture A-270
price paid for Bushman Z-358 Gorizla (gō-rēt'sē-ā), Italy, 20 ml. n.w. of Trieste; pcp. 30,265; capital

of former Austrian crownland of Gorizia and Gradisca; ceded to Italy by Treaty of Rapallo (1920); map E-425

Italians capture W-225, 226 forki, also Gorky (főr'ki). Russia, formerly (until 1932) Nijni Novgorod, trade center of e. on Volga River, 255 mi. n.e. of Moscow; pop. 900,000: maps R-266, E-417, picture

falrs F-12 Gorky, Maxim ("Maxim the Bitter"), real name Alexis Peshkov (16681936), Russian revolutionist, shortstory writer, novelist, born dramatist, Nijnl Novgorod: obliged to earn own living at age of nine; wrote realistically of the oppressed and outcasts of society: R-295, pictures R-289, R-295

chief works R-296, D-137 Görlltz (gur'lits), Germany, town on Polish border, on Neisse River, 55 nii. e. of Dresden; pop. 85,686; maps G-88, L-424

Gorman, Willis (1816-76), American lawyer, soldier, and 2d territorial governor of Minnesota (1853-57); served in Mexican war and was made brigadier general for distin-guished services In Civii War.

Gorrie, John (1803-55), physician, born Charleston, S. C.; settled in Apalachicola, Fla., 1833; invented mechanical refrigeration; obtained patent 1851; applied principle to cooling sickrooms and hospitals; statue presented to Statuary Hall 1914 by state of Floridas, B-95 1914 by state of Florida: R-96 Gorse. Sec in Index Furze

Gorton, Samuel (1592?-1677), American colonist, author, founder of "Gortonites." religious sect; born Gorton, England; removed to Mass. 1637; after stormy years because of religious beliefs settled in Warwick, R. I., 1648; In R. I. legislature 1649-66. Gortsna (gor-ti'na), next to Cnossus

largest and most powerful city of ancient Crete, near center of island. Gosnet, or Gossart, Jenni (died 1532), real name of Jan Mabuse, first of the "Italianized" Flemish painters. Goschen, Sir William Edward (1847-

1924), British diplomat; ambas-sador to Germany, 1908-14: W-218 osden, Freeman Fisher (Amos) Gosden, Treeman Fisher (Amos)
(born 1899), radio and television
writer, also actor, born Richmond,
Va.; with Charles J. Correli created
radio serial 'Amos 'n Andy' (entitled 'Sam 'n Henry' 1925-2') and wrote sam n Henry 1922-21) and wrote script for television serial 'Amos 'n Andy' from July 1951. Gos'hawk H-291, 292, 293, pictures H-292, A-250 Goshen (Jö'shēn), the region in Egypt commission of the commissio

occupied by the Israelites, w. of modern Suez Canal (Gen. xiv. 10). Goshen, Ind., city on Ekhart River 23 ml. s.e. of South Bend: pop. 13. 003; flower-growing; iron products, furniture, rubber goods; Gost College (Mennonite): map 1-78 Goshen Goshen College, at Goshen, Ind.

Mennonite; chartered 1894; opened 1894; arts and sciences, nursiog. theology. Goshenite, a gem stone J-349 Goslar, Germany, city in Lower Sax-ony; has kept its medieval herit-age: a Romanesque palace from the

age: a Romanesque parace from the 11th century and several Roman-esque and Gothic churches; belonged to the Hanscatic League; tourist center for Harz Mountain trips; pop. 40,735. Gos'nold, Bartholomew (died 1607), English navigator and explorer, leading colonist of Jamestown, Va.; died there England explorations A-190,

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osse (90s), Sir Edmund William (1849-1928), English poet and critic ('Aspects and Impressions', criti-Gosse cism; 'Father and Son', biography;

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Key: cápe, át, fár, fást, what, fall; mê, yét, férn, thére; ice, bit; rów, wón, fór, nót, do; cúre, bút, rude, full, búrn; out;

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Coburs Cotha Friedensiela Casile Getham a village in Nortingham thire England inhabitants of shire England inhabitants or which are estd to have played the fool in order to diseased king John from settling there and burdening them with expense of royal real dence hence called Wise king of Alson ackname of the York City first used by Washington

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tlat2-59) paniel and composer
brn tew Ordenia La greated
su cesa in playing, his own com
p vitions through ut U S and
Latin America died at Rio d
Jameiro best known for plane Goffsehall.

Le Ba Peres t The Last Hope

perce (The Last riope Le Ba nanter) Gouche (guzeh) in painting P 37c Gouche (duzeh) in painting P 37c for women founded 1885 as Woman's College of Battimore opened lass changed hame 1910

arts and sciences ifts and sciences
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land error up in Wells and El) Gaude (g

Cathedral loune which form background of A City of Bells oil or broka Green Dolph a Street 1 ligrim s Inn Gentiat Hill udy (gos di) Frederic W (1062

Couds 1147) type designer and printer born Bi on ington fil created nore than a hundred type faces created auth r of several books on lettering and type design lecturer on type

des gn and ispostraphy founded Village Press iname given to his privale press wherever he lived) he syponraphic at le has been im fixing contemporary portani in trende T 230

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Gangh (gof) Sir Hubart (born 1870) By theh general commanded l'Ifth Army during German Somme offen March 1918 made scapegoat or fallure of his superiors to give

htm assequate support
Gough Juan B (1817-88) American
ien perance tecturer born England popular for his carpest but amos ing addresses

Googh Island in Atlantic Ocean A 451 Gouin (00 as) Sir Loner (1863-ty"s) Canad an lawyer and states prem er and man Liberal seader premer and altorney general of Quebec 1905-

20 Canadian mulister of justice to King cabinel 1227-24 heuten ant governor of Quebec 1928 Gooden (99 shon ) Jean (1515"-66?) brench Renaissance sculptor and

skillful metalworker architect 8 784 ountain of the Nymphs picture

Goulbarn Rivee in Victoria Australia tributary of Marray River long nav gul le la ste louer course ould George Jay (1864-1923) capitalisi born New York City eldest son of Jay Gould controlled

many rattroads. tnetudtne Missouri Pacific and the Wabash Genid Jay 11836-92) self made cep ital 4t, born Poxbury N Y early associate of Dantet Drew and Jim Pisk in mantpulating Erle railroad

stocks gained mastery over what became the Gould system of roads with F sk tried to corner gold mar with Fak tried to corner gold mar ket caus ng Black Friday pante Goull Morton thorn 1913) pianjat and composer born Richmond Hit Long Island N Y used jazz rhythma in compositions (Ameri can Symphonetic Concertette)

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Canadian suther and agilator born
Fifeshire bootland came to Canada
18:7 known for criticum of the 1817 known for critchem of the poor laws and of the Family Com part benished from Ceneda until 1842 (Statistical Account of Upper Canada )

Geermoni sermoni (por mon) Rémy de (1858-1915) French critic and most second only to Anstole France as an authority on confemporary arettem of Huysmans and symbot tsm of Mallarmé

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Government Printing Office, the official overnment Printing Office, the official printing and publishing plant of the U.S. government, established 1860 by act of Congress; supplies all printing, publishing, and stationery needs of the federal government. Office is under supervision of a Congressional committee and ery needs of the federal government. Office is under supervision of a Congressional conumittee and is managed by the Public Frinter who is appointed by the president with the approval of the Senate. Superintendent of documents has charge of the sale of government publications: picture W-31

Government regulation of industry. See also in Index Government own-

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Governor general in Canada C-91, 92 carly powers C-97

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flag F-136a, color picture F-131
Governors, Island, fortified Island in
New York City harbor at junction
of Hudson and East rivers; area
about 125 acres; called Nooten 1stond for Futch colonists, registed land by Dutch colonists; received present name in late 17th century when colonial governors established a summer residence there Now site

a summer residence there. Now site of Fort Jay and headquarters of First Army of the U.S.: map N-222 Gover, John (1325?-14081. English poet, called by Chaucer "moral Gower" and by Lowell "undertaker of the fair medieval legend"; chief work, "Confessio Amantis, includes many moral stories warning a lover many moral stories warning a lover

many moral stories warning a lover against the vices of that day.

Guwrie, John Ruthven, 30 earl of (1577?-1600), Scottish nohleman killed, with his brother Alexander, in apparent attempt to assassinate wing James VI of Scotting arms in apparent attempt to assassinate king James VI of Scotland: some evidence that "Gowrie's Conspiracy" may have been a story contrived to hide the king's fault in a quarret which led to vidence. quarrel which led to violence.

quarrel which led to violence.
Gowrie, William, first earl of (1541284), Scottish nobleman; concerned
in murder of Rizzio in 1566; custodian of Mary, queen of Scots, at
Lochleven; captured James VI of
Scotland in 1582; executed for
treason by order of James.

Goya (56'yd) y Lucientes, Francisco
José de (1746-1828), Spanish
portrait painter, lithographer, and
etcher; greatest Spanish artist
between Velásquez and Fortuny;
notable portraits of Charles IV and

Queen Maria Louisa, duchess of Alva, duke of Wellington: P-31a, D-140b early flying, picture A-101 cichings E-387

'Schora Sabasa García', color picture tapestry designed by, picture M-27 Goynz, Brazil, See in Index Goiás

Goyen, Jun Josephszoon van (1596-1656), Dutch landscape painter, depicted typical landscapes with naturalistic truth unmixed with sentiment; cool tints in the skies and scanty detail in foliage. Gozo (yōd'zō), Island of British colony

of Malta in Mcditerranean 3 mi. n.w. of Malta; 26 sq. mi.: map E-425

Gozzi (gūt'sc), Cnrlo (1722-1806), Italian dramatist; wrote plays, sa-tlrical dramas founded on fairy tales, and tragedies with a comic element; "Turandot" best known.

forzoll (jöt/sör/), Bengzzo (bö-nöt/tső) (1420-98?), Florentine painter, real name Bengzzo di Lese; worked under Fra Angelico; celled at richly decorative religious frescoes ('Madonna and Child with Saints'; 'Journey of the Magi to Bethlehem'; frescoes depicting lives of St. Francis and St. Augustine).

Grabnu, Mary Antiu. See in Index Antin, Mary

Graben (gra'ben), street in Vienna, built over medieval moat V-472

Grabhorn, Edwin and Robert, brothers, contemporary American printers for many years working in San Francisco; known for skillful use of fine types and careful composi-tion; leaders in group sometimes called California school of printers.

Grac'chus, Gains Sempronius (153-121 B.C.), Roman popular leader, son of Cornelia and brother of Tiberlus Gracchus; as tribune of the people 123-121 s.c. carried out his brother's judicial and social re-forms: R-186 alds poor classes P-368

Grnechus, Tiberlus Sempronlus (163-

123 n.c.), Roman tribune in 133 n.c. proposed agrarian laws and other reforms for relief of poor; mur-dered in riot caused by his attempt secure re-election as tribune: to R-186

Grave, in religion, the enjoyment of God's favor; spiritual gift of God by which man is able to choose the right and find salvation; in Roman Catholic church the state of grace is held to be obtained through the sacraments. The term grace is also used for a prayer before or after a meal, asking blessing or returning thanks.

Grace, they of. See in Index Days of grace

Grace note. See in Index Music, table

of musical terms and forms Graces, in Greck mythology, three daughters of Hera and Zeus: Eu-Aglaia phrosync (joyfulness). Aglaia (brightness), and Thalia (bloom). phrosync goddesses of grace and charm Aphrodite and A-274

racian (grā-thē-ān'), Baltasar (1601-58), Spanish writer and Jesult; style concise and epigram-matic, but sometimes obscure; best Graelán known for philosophical novel El Criticon'.

Grackle, a blackbird boat-talled B-203 bronzed B-203 purple B-203

Gradation, in geology, the building up (aggradation) or wearing down (aggradation) or wearing (degradation) of land E-181

nady Henry Woodfin (1850-89) journal of an i trafor form Athens Ga in 1979 he bought chare In Crade Ga in 14"9 ne nought enare in Itianta fonstitution and an editor did much to remore frien lig rela Hons belween North and South lee

tured on The New Coulh menument in Allania A 451 Cracee (frec) in Creek mythology the gray ones three staters Dun Payo and Pephredas daugh ters of Celo and Thomas gray

haired from birth. Craeto Rontti Wiesilling V. 305 Greis (fr ta) Helorich (1817-91) Ceman Jiwi h hiel rian province of P een professor I all versity of Lieslan \*n years in all

noted for his scholarly history of the Jeus which has been | range late | injo several languages fraf or Craft tis (11%37-1527)

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B 34 Expellin German Africa bie B 34

Croham mag George Peery (1894-1945)
Canad an journalist and statesman
Liberal leader in Ontario legista
ture 1888-1907 later in House of
Commiss minusier of ril ways Comm ne minister of ril ways and canals 1907-11 1923-26 Gralum Gwelhalon (Aire David C

Taiden Then son 1 Taiden Then son! (born 1913)
Canadian novelest bern Torento
On Looks stress and a prolifera (Bules words Farih and High

Grad sen lames Viscount Dundee See M Inter Claverhouse Graham Meilha dancer and chore excapher leading exponent of the modern dance in US born Pills

born Pills burgh Pa begin aludy s lih J uth 1916 New York debul Denia 1916 New York debu 1926 legs Vermoni and at the S hoof of American Ballel New York City Chreegraphics Include Frontier American Document D 144 pts American Document

Graham Rolert Buniline Cunning Bet in Inder Cunninghame Craham oranam oranam Shirley (born 1906) Negro-Luthor and composer horn Indian spo s ind wrote and composer

spo s ind wrote and composed music dram from Tom Con (biograph les norks on Frederick Douglass Benjamin Banneker Ceorge Wash Phills Whealter) Phills Whealley) Cializan Sylvenier

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Grand Canyon, of Snake River, small eanyon in Wyoming near the Idaho boundary, map I-14

Grand Canyon of the Snake River, long gorge in Snake River where it forms part of Idaho-Oregon boundary; deepest eanyon in North America; averages 5500-ft. depth for 40 miles; deepest point 7900 ft. in southern part called Hell's Canyon or Seven Devlis Canyon or averages 5500-ft. depth Box Canyon: 0-408, I-13, map I-14 rand Canyon of the Waimea, Ha-

Grand Canyon of the Wa waiian Islands H-288a Grand Central Station, New York City,

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Grand Coulee Dam, in Washington, on the Columbia River C-415b, I-251, D-6, 11b, maps W-45, C-415b, pictures D-11, W-67, 69. See also in Index Dam, table

Coulee Dam National Recreation Area N-38d, map N-18 salmon industry S-29 size compared with other structures,

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and Dixence Dam, in Switzerland, on Dixence River. See also in In-Grand dex, Dam, table Grande Comore, Island. See in Index

Comoro Islands Grandee, title of honor borne by

highest class of Spanish and Portu guese nobllity; formerly implied

guese noninty; formerly implied important privileges
Grand Falls, New Brunswick, Canada, town on St. John River 90 ml n.w., of Fredericton; pop. 2365; agricultural region; lumber and pulpwood; fishing: N.138, 1386, pag. C.72 fishing: N-138-138a, map C-73

Grand Falls, of the Hamilton River, Labrador L-76, map C-73

Grandfather clause, provision formerly included in constitution of several Southern states which excuses from other suffrage tests those who have served in any war and their de-seendants and those who were voters before Jan. 1, 1867, and their deseendants; adopted as means of restricting suffrage to white voters; declared unconstitutional 1915.

Grandfather Frost, Russian Santa Claus R-273

Grandfather's clock W-55, picture W-56

Grand fir. See in Index Giant fir

Grand Forks, N. D., 2d city in state, on e. boundary, at junction of Red River of the North and Red Lake River; pop. 26,836; flour, packing-house products, potato products; beet-sugar refining area; N-291, maps N-289, U-252-3

state-owned mill and elevator, pic-

ture N-281

University of North Dakota, pieture

Grand Haven, Mieh., port and summer Grand Haven, Mieh., port and summer resort on Lake Miehigan at mouth of Grand River 25 ml. w. of Grand Raplds; pop. 9536; fishing, fruit, and celery interests; various manufactures; government weather station; state park: map M-227 Grandi (grān'dē), Dino (born 1895).

Italian statesman; identified with Faselst party from its beginning and played conspicuous part in Fas-elst march on Rome; minister of foreign affairs 1929-32; ambassa-dor to England 1932-39; minister of justlee 1939-13; sentenced to die 1944 for taking part in overthrow

of Mussolini, escaped to Portugal, Grand Island, Neb., city about 85 mi, w. of Lincoln; pop. 22,682; railroad sbops; livestock marketing; army ordnance Installation; beet sugar, flour; State Soldiers and Sailors Home: N-106, maps N-103, U-252 Grandlson, Sir Charles. See in Index 'Sir Charles Grandison'

Grand Junction, Colo., agricultural, industrial, and mining center at junction of Colorado and Gunnison rivers, near Utah border; pop. 14.-504; Mesa County Junior College; maps C-408, U-252

Grand Jury J-366. See also in Index Law, table of legal terms Henry II establishes H-335

Grand Lake, largest lake of New-foundland, length 56 mi.; 192 sq. ml.: map C-73

Grand Lama. See in Index Dalai Lama Grand Mannn (ma-nān') Island, at

mouth of Bay of Fundy; pop. 2687: N-138, map C-73 Grand' Mère (gran mèr'), Quebec,

rand' Mère (gran mèr'), Quebee, lumber-manufacturing city on St. Maurice River, about 25 ml. n. of Trois-Rivières; pop. 11,089; pulp, paper, furniture, rubber goods

Grand Monarch, The. Sec in Index Louis XIV, Eing of France Grand mufti, chief of Mohammedan theologians. See also in Index

Grand Old Man, Gladstone G-118, picture G-118

Grand Old Party, name given to Re-publican party by campaigners in 1680, since shortened to G. O. P. Grand opera. See in Index Opera

Grand plano P-249, picture P-250 rand Portage, nine-mile overland carrying route in n.e. Minnesota between Lake Superlor and Pigeon River, famous in American fur trade and exploration history; trading post maintained here by North West Company.

Grand Prairie, Tex., city 12 ml. s.w. of Dallas; pop. 14.594: map, inset

Grand Prê (grāń prā), Nova Scotla, historic village about 45 mi. n.w. of Halifax. In farming and frultgrowing district; famous as seene of Longfellow's 'Evangellne'; A-5, 6

statue of Evangeline, picture A-6 Grand Prix de Rome. See in Index Prix de Rome

rand Rapids, Mich., "furniture capital of United States"; pop. 176.515: G-151, maps M-227, U-253 Grand furniture market F-319a

Grand Remonstrance, protest against misgovernment presented to Charles I (1641) by English House of Commons; the king's Impeach-ment of and attempt to arrest the 5 leaders responsible for the Re-monstrance were causes of the monstrance were causes English Civil War: C-191

Grand Rhone, in France, branch of Rhone River R-146

Grand River, Labrador, See in Index Hamilton River

Grand River, in Oklaboma. See in Index Neosho River Grand River, S. D., rises in n.w.; flows e. to Missouri River; maps S-296,

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Grand River Dam (Pensaeola Dam)

in Oklahoma, on Grand (Neosho) River, pieture O-374 Grand Teton National Park, in Wyoming N-35, map N-18, pietures N-34, F-237, W-315

Grand Teton Peak, in Wyoming, in Teton range of Rocky Mountains (13,766 ft.) N-35, picture N-34

Grand Trunk Pacific Railroad C-83 Grand Union flag, or Cambridge flag F-130d, color pieture F-128

Grand white fir. See in Index Giant fir Grange, Harold E. (Red) (born 1904), football player, born Wheaton, Ill.; University of Illinols halthack 1922-25; played professional foot-ball 1925 through 1934; wore number 77 on uniform; author of 'Zuppke of Illinois': F-232 Grange, National, See in Index National Grange

Granger movement, for regulating railroad rates A-391-2, R-69d

Granla (gra'ni-a), or Grainne (gran), In Celtie mythology the Helen of the Fenian eyele of old Irlsh tales, Fenian eyele of old Irish tales, beautiful young betrothed of the old Finn; deserts him for Dermot, but weds him when Dermot dies.

Granleus (\$\tilde{\textit{gra-ni}^{\textit{List}}}\$, ancient name

of small river in n.w. Asia Minor where Alexander the Great won first victory over Persians 334 B.C.

Granite G-151 eommereial types Q-2

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Granite City, Ill., manufacturing city
near Mississippi River, just n. of
St. Louis, Mo.; pop. 29,465; Iron and

steel, coke, chemicals, graniteware, corn products: map, inset I-37 Granite Hills, in Vermont V-459 Granite Peak, in Rocky Mis., highest point in Montana (12,650 ft.); in s part of state, n.e. of Yellowstone National Park: maps M-374-5, 367 Granite State, popular name for New

Hampshire Granlteware E-342

Granny knot, or lubber's knot K-60 Gran Quivira (gran kë-rë ra) Na-tional Monument, in New Mexico N-35, N-181, map N-18

Granson, battle of (1476) C-195

Grant, Duncan (born 1885), British painter; a modernist strongly in-fluenced by Cézanne ('The Lemon Gatherers'; 'Tight-rope Walker').

Grant, Frederick Dent (1850-1912), American general; accompanied American general; aeeompanied father, Gen. U. S. Grant, in many Civil War campalgns; graduated West Point 1871 but resigned from army 1881; colonel of volunteers 1898, served in Cuba and Philippines, successively promoted until major general in regular army.

Grant, George Monro (1835-1902), Canadian clergyman and educator, known for his eloquence on political platform scareely less than in pul-plt; for 25 years principal of Queen's University; made it one of leading Canadlan institutions.

Grant, Julia Dent (1826-1902), wife of President Grant W-128a, G-152

Grant. Robert (1852-1940), judge and author, born Boston ('Unleavened Bread'; 'The Chippendales'; 'Four-score—An Autobiography').

rant, Ulysses S. (1822-85), 18th president of U. S. G-152-3, picture Grant.

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Granville Backer Harley Granville (1877 1946) English play vilght Granville (187) 1946) Lough b picx vitable producer an Juville on the head of the producer and producer and producer and solidary constant and the producer and producer an

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Grav, Elisha (1835-1901) inventor
born Barnesville Belmont County Ohio, perfected telegraphic devices,

invented telautograph telephone B-122

Gray, Elizabeth Janet (Mis Morgan Vinlng) (born 1902) author born Philadelphia Pa of Quaker an-cestry, books for children 'Jane Hope', 'Penn, 'Adam of the Road awarded Newbery medal 1943 Her experiences as tutor, 1946-50 of Akhito, crown prince of Japan are told in her book Windows for the Crown Prince'

Gris, George (1840-1925) jurist and legislator born New Castle Del, U S senator (Democratic) 1885-99, staneh supporter of President Cleveland U S Circuit Court Judge 1899-1914

Gray, Gordon (born 1909) lawyer, newspaper owner, born Baltimore, Md, appointed assistant secretary of army Sept 1947, secretary of army 1949-50, elected president University of North Carolina 1950 ray, Hawthorae C. (1889-1927),

American Army officer (captain) Gray.

and aeroaaut balloon ascensions B-36

Grav, Robert (1755-1806), navigator, born near Twerton, R I, Navi officer during Revolution, master of Columbia, first ship to carry American flag around world, sent by Boston merehants to trade for furs with Indians on Pacific coast Columbia River named by C-416, 0-410

Gray, Stephen (1696-1736), English electrician, discovered electric properties of many substances. electric

ray, Thomas (1716-71), English poet, rebelled against classicism; great student and possessed vast knowledge of classical authorpainting archive Gray, painting, architecture and botany; his greatest poem 'Elegy Written in a Country Churchyard', made him one of the immortals of English literature E-378b Gray, a color C-392, 394 color intensity lowered by, color

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(1882-1955), Italian marshal born 50 mi se of Rome vicerov of Ethiopia 1936–37 commander Italian forces in Africa and gover-Italian forces in Allica and gover-nor general Libva 1940-41 defense minister Mussolinis puppet regime 1943-45; found guilty of treason 1950, later released

Grazing land. See in Index Pasture lands

Grenser, nickname for Mexican N-235 Greasewood, a spiny shrub (Sarco-batus remiculatis) of the goosefoot family with fleshy leaves common in Rocky Mt region grows in alkaline and saline solls; used as indicator of salty soil farmers avoid land where it is abundant

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Great anteater A-261-2 Great Mantie & Pacific Tea Company, The, a retail food chain store com-pany, established as tea stores by George F Gilman (1826-1901), a liide and leather merehant, and George H Hartford (1833-1917), an employee who concerned the profitable method of merchandizing tea and became partner and manager 1878, Hartford's sons, George L (born 1664) and John A (1872-1951), continued management of the business C-181

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piclure Great blue heron II 350 H-349, color picture B-180

Great Books Programa, term applied to study by adults of present-day problems through reading and group Western discussion of classics of World, program organized by John Ersking for American soldiers in Europe after World War I, later developed at Columbia University University of Chicago, and St Iohn's College, great books programs for adults introduced in New York Chicago, and St Iohn's College, great books programs for adults introduced in New York. 1927, and Highland Park, Ill 1930, Great Books Foundation, a nonprofit organization, established at Chicago 1947 to help organize groups throughout country

groups throughout country
Great Britain, or Britain, political
innon comprising England Wales
and Scotland, 88 745 sq mi, pop
48 840,893, including Isle of Man
and Channel Islands 89,041 sq mi
pop 48 998 882 The term Great
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nama given to Domenico Theoto

GREECE copui: (thā-ō-lō-kō-pg'lē) (1541?-Cretan-Spanish painter. 1614). born Crete; figures generally elongated; although his predominant color is often grayish and seemingly lifeless he attained high dramatic effects by a skillful use of light and by areas of rich and glow-ing color; vision, intense emotion, and sincerity in his works; in later and sincerity in his works; in later years religious mysticism was a dominant force in his art ("The Burial of the Count Orgaz"; "The Disrobing of Christ"): P-27b The Assumption of the Virgin' P-27b, color picture P-27c Greece, kingdom in se Europe occupying s. part of Balkan Pennsula; about 51,000 sq. mi., pop. 7,631,124; cap Athens G-188-96, maps G-189, B-23, E-417, piclures G-188, 190-5 agriculture G-189-90, pictures G-191-2: farm life G-190, pictures G-191-2, 194 Athens A-447. cities, list G-188 Athens A-447-9, pictures A-447-8, mans A-448 Salonika S-29 climate G-189 clothing, pictures G-192, 194 commerce: exports and imports, G-191, see also in Index Trade, table; ships, tonnage S-161 Corinth C-478 Crete C-510-11, piclure C-519 doll. color plcture D-122c earthquake in Ionian Islands E-197 flag F-136b, color picture F-132 government G-194-6 listory G-191, 193-6 lindependence won (Peace of Adrianople) G-191: Byron alds B-373 Balkan wars (1912-13) G-193 World War I W-230, G-193. Sec also in Index World War I, chronol-083 peace settlement G-193 Venizelos V-446 division of Macedonia M-7-8 war with Turkey W-240, G-193: Smyrna S-203 republic established G-194 dictatorship G-194 George II restored to throne G-195 World War II G-194-5. See also in Index World War II, chronology Italian invasion W-255 German occupation G-194-5. W-255 Crete W-257 Germans withdraw G-195, W-268 monarchy restored G-195 peace treaty awards (1947) G-195 clvll war G-195, 196: appeals to United Nations (1946) U-240b United States provides aid G-196, U-393, T-198 immigration and emigration G-193. industries G-191 national song N-43 natural features G-188-9, list G-188 people G-191: how the people live G-189-91, pictures G-188, 191-2; racial classification R-23, chart R-22 products G-190, 191, list G-188 relationships in continent, maps E-416-17, 419-20, 429, 429d religion G-190-1 ships: tonnage S-161 theater D-14d Thrace T-123 woman suffrage G-196 Greece, ancient G-196-202, A-27, G-197, pictures G-1

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Green Anna Balharlis (Mrs Charles Roblis) (1846-1935) author of detective stories born Brooklyn

Julian Green lived mostly in France (The Selbys The Silent Duchess Just Before the Dawn)

Duchess Just Before the Dawn J Green Henry pen name of Henry Vio-crea Horse pen name of Henry Vio-crea Yorke (horn 1995) English Banufacturer and novellet from boyhood wrote novels for recrea tion (Caught Loving Mothing) The Herry (1933-1919) financier (1933-1919) financier (1934-1935-1919) financier (1934-1935-1919) financier

born New Bedford Mass noted for shrewdness and partitionallossesses believed to be richest woman of her day in U a Green John Richmed (1817-83) Eng. Beh bishorian his History of the Euglish People grabite and soputar in style (Making of England) quoted on Washington W 27

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Journey ) irren Paul Ellet (born 1894) play Wright and novellst, born Lillington N C taught at University of North Carolina Negroes and lowly favorile lines. Bosom Southerners a

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Oreen Thumas Hill (1826-83) Eng lish philosopher chief English rep-resentative of Nec Hegellan school Pesentalive of Not Hegelian school of philosophy maintained knowl edge to be reproduction of eternal mind in human personality theory industrial theory industrial theory industrial theory industrial theory industrial to the control of the control

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Green Mountains, range of Appalachian system extending through Vermont; highest peak, Mt, Mansfield (4893 ft.): V-459, maps A-276, V-457, N-144, U-259, picture U-258 Green Mountain Stote, popular name for Vermont for Vermont.

Greenock (gren'ok), Scotland, port 20 mi. n.w. of Glasgow; pop.

76,299; shipbuilding: map B-324 Greenough (ápřán'ó), Horatio (1805– 52), sculptor, born Boston; designed Bunker Hill Monument and colossal

Bunker Hill Monument and colossal statue of Washington In Washington, D. C.: S-80
Green plover. Sce in Index Lapwing Green River. In Kentucky. 350 ml. long; joins the Ohlo River se of Evansville, Ind.: maps K-23, 30-1
Green River, rises in Wyoming; unites with Colorado in se. Utah; 730 ml. long: C-414b, maps U-410, 416-17, U-296-7, W-316, 322, C-414b, picture C-414a C-414a

Greensaod, a clay or sand, colored green by glauconite M-266
New Jersey deposits P-390
Greensboro, N. C., manufacturing city
70 mi. n.w. of Raleigh; pop. 74,389; cotton textiles, rayon textiles, paper cotton textiles, rayon textiles, paper cartons, chemicals, brick, hosiery; insurance center; Greensboro College, Woman's College of University of North Carolina, Bennett College, Agricultural and Technical College of North Carolina; named for Nathanael Greene: maps N-274, USE U-253

Greensboro College, at Greensboro, N. C.; Mcthodist; for women; chartered 1838; opened 1846; arts and sciences.

Greensborg, Pa., center of a coal-mining, coking, and natural-gas re-gion, 26 mi. se, of Pittsburgh; pop, 16,923; iron, steel, and glass products; Seton Hill College: mnp P-132 Green snail, or green turbao, a shell

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Green turtle (Chelonia mydas) T-224, picture T-223 Greenville, Miss., clty, a port on Mis-sissippi River about 95 mi. n.w. of Jackson; pop. 29,936; lumber and paper products, concrete products,

paper products, concrete products, rugs, chemicals, cotton and soybean products: maps M-302, U-253 Greenville, N. C., city 73 ml. s.e. of Raleigh; pop. 16,724; large tobacco market and warehouses; founded 1756, named for Gen. Nathanael Greene; East Carolina College: Greene; E map N-275

map N-216
Greeoville, Ohlo, clty ln w., 34 ml. n.w.
of Dayton; pop. 8859; large gravelproducing plant; scene of Gen.
Anthony Wayne's Treaty of Greenville with Indian tribes; map O-356

Wayne's treaty with Indians W-77 Greeoville, S. C., textile city, cotton

market in extreme n.w.; pop. 58,161; market in extreme hww.; 505, 53, 511, Furman University, Bob Jones University; S-284, maps S-290, U-253 Greenville, Tex., trade center 50 mi. n.e. of Dallas; pop. 14,727; cotton-

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Greenville College, at Greenville, Ill.; Free Methodist; founded in 1855; arts and sciences, theology.

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Greeowoy, John C. (1872-1926), solrecowoy, Join C. (1812-18-20), Sondier and mining engineer, born Huntsville, Ala.; officer in Spanish-American War and World War I; promoted copper mining in Southwest. Scc also in Index Statuary Hall (Arizona), table

Greenwich (grein'rich, also gren'ich).
Conn., summer resort 28 ml. n e of
New York City; pop. of township,
40,835; founded by Dutch in 1645,
scene of battle in Revolutionary
War: map C-444

Greenwich (grin'ig, also gren'ich), England, borough of London on Thames; pop. 91,492; naval hos-pital and college, lies on prime meridlan: L-306, map, inset B-325 meridian L-133

Royal Observatory. Sec in Index Royal Observatory

Greenwich Civil Time T-137, L-313, diagram L-312, map T-135 Greenwich (grinich) Village, New

York City N-219 Greenwood, Arthur (1880-1954), British political leader, born Hunslet,

Leeds, England; member Parliament (Labor) after 1922; deputy leader, Labor party, after 1942; lord privy seal 1945-47; paymaster general 1946-47.

Greenwood, Miss., city on Yazoo River

86 ml. n. of Jackson; pop. 18,061; cotton market; cotton products, metal products, drugs: map M-302 Greenwood, S. C., clty 67 mi. n w. of Columbia; pop. 13,806; textiles, garments; cotton, lumber, machine shop and creamery products; Lander College: maps S-290, U-253 Greet, SIr Philip Ben (1857-1936), English actor and manager; pre-sented Shakespeare's plays as done and creamery

in Elizabethan times. Gregg, John Robert (1867-1948), ed-

ucator, author, born Ireland, emi-grated to U. S. (1893); founder of Gregg system of shorthand; author of books on system: S-166 regg shorthand S-166-7, picture

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Gregor (greg'er), William (1761-1817), English clergyman and mineralogist, discoverer of titanium. Grego'rlan calendar C-22-3, Y-335 Russia adopts R-273
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Gregory, the Illominotor, Soint (257?-337?), reputed founder and patron saint of Armenlan church; festival

October 1: A-374
Gregory, popes. In addition to those below, see in Index Popes, table
Gregory I, the Great, Saint (540?-604), pope; commemorate Starch 12: G-214 commemorated as saint

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church music M-459, G-214
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Gregory II, Solnt (died 731), pope
715-731, born Rome; opposition to
Byzantine Empire united Lombards and papacy; commemorated as saint February 11

Saint Boniface and B-228 Gregory VI (dled 1047), pope G-214 Gregory VII, Hildebrand (1020-85), pope: commemorated as saint May 25: G-214-15, picture H-334 investiture conflict H-334-5, G-214-15 Gregory IX (1145?-1241), pope G-215 Gregory XI (1331-78), pope G-216 Gregory XII (1327?-1417), pope

G-215 Gregory XIII (1502-85), pope 1572-85 G-215

built Villa Taverna, in Rome R-192 calendar reform C-22, Y-335

Gregory XVI (1765-1846), pope G-215 Gregory, Horace (born 1898), poet and critle, born Milwaukee, Wls.; lecturer, Sarah Lawrence College since 1934 ('Poems, 1930–1940' and 'The Shield of Achilles; Essays on Pollege in Poetry')

'The Shield of Achilles; Essays on Bellefs in Poetry').
Gregory, Lady Isabelia Augusto (1852-1932). Irish dramatist and romance writer, associated with Yeats in Irish literary revival ('Gods and Fighting Men'; 'Irish Folk History Plays'): I-234

Gregory, St., Knights of. See in Index

Knights of St Gregory Gregory of Nozian'zus, Soint (329?-339?), churchman whose writings contain hest statement of doctrine contain nest statement of doctrine of Trinity in Greek orthodox the ology; a graceful and powerful expounder but not an original thinker; festival May 9.

Gregory of Nys'sa, Saint (331-386?), Greek churchman who anticipated transubstantiation doctrine; con-

transubstantiation doctrine; con-structive thinker, festival March 9. Gremlins, in folkiore, pixies that play tricks; may be devilish or good-humored and beneficent; young cailed widgets, females fifinellas; first reported by R.A.F. fliers in 1923; name said to be from obsolete English verb greme, "to vex." Grenndn (gre-na'da), southernmost of

Windward Islands; 120 sq. mi.; pop. windward Islands; 120 sq. ml.; pop. 65,618; with s Grenadines (13 sq. ml.), it forms British colony of Grenada (area 133 sq. ml.; pop. 72,387); cap. St. George's; cacao, nutmegs. coconuts; health resort: maps W-96g, N-251
Grenode (\$\bar{grc}ndd')\$ (from French grenade, "pomegranate"), military weapon; made of steel, containing theh explosives sometimes gase of

high explosives, sometimes gas- or flame-producing chemicals; made to be thrown by hand or rifle; used in 17th century; highly developed in World War I: picture C-208

Grenadier', originally a soldier whose special duty was to throw hand grenades. As these were picked mcn, chosen for their boldness and strength, the term came to be applied to members of a special corps.

Grenadine (gren-a-den'), a reddish, sweet syrup made from pomegranate juice.

Grecodine, a silk, cotton, or wool fabrlc similar to marquisette in weave. Grenadines, chain of 600 small islands

of Windward Islands, British West Indies, stretching for 60 miles be-tween Grenada and St. Vincent, map W-96a

Grendel, monster slain by Beowulf B-125

Grenfell, Sir Wilfred Thomason (1865-1940), British medical missionary in Labrador G-215, picture G-215

Grenoble (grū-n6'blū), France, forti-fied city on Isère River 60 mi. se. of Lyons; pop. 97,287; university: maps F-270, I-262, E-425 Gren'tille, George (1712-70), English

statesman; prime minister 1763; secured passage of American Stamp

secured passage of American Stating
Act, one of causes of American
Revolution: R-121
Grenville, Sir Richord (1541?-91),
English naval hero; commanded
flect carrying colonists to Roanoke
Island in 1555; killed when his ship
Revenge tried to cut way through

tenge ) Grenville William Wyndham Barn (1759-1834) Linglish statesman son of George Graville as premer (1807) see ared aboillion of English slave trade advocated Catholic

emancipalion emancipanion resh am Sir Thomas (15192-73t English merchani and royal finan cial agent founder of Royal Ex Cresh am

change and Gresham a College Greel am Waller Quinton (1832 95) American jur al and etalesman major general in Cavit War ercre treasury 1944 secretary of giale 1893 as poelmagler peneral barred all lollerles from mails

Gresham a law in ec nomics princi-ple that bad money drives out lendency of money having gool less intrings value to displace more

Greichaninoff or Crechaninov Alexandse (Tikhar vich) (born 1864) American con poser born Moscow Rus to poser born Moscow Rus to in U S after 1939 kn wn for somes and Russian thurch mus wrote operas and a mohunica sule

blography My Life i-rerhanipsy Alexandre See in Indea Gretchaninoff Cretchen in Faust ogends F 46 Grethel Cammer (Frau Vichmannin)

Grethel (\*\*emmer (Fr. u \ lebminnin) old (German w mm whoe stories of Good (\*\*) of the story lake of Contractice of the story lake of the s

T3 324 Grence (Jr3a) Jean Bapliete (1725-1855) French genre and portrait painter in painting like Poussesu

in literature he represents a se mental return to nature (The Broken Pitcher Innocence t Greellie Charles C F (1794-1865) English public official, and 6 211st ( The and 6 arist

whose journals (published 1875 67) contain rich h storical material for first half of 19th century

Greville Falke first Baron Brooke See in Infer Brooke bulke Gre ville first Bar n Gresilles (ord all en) or all konk a perennial (Gresilles pot ata) of the protes family native to Australia Used as house plant erect leaves femilike gross to 70 ft in Callingula and is used as shade free in Australia all aine 150 fr flowers Lumber elaelac orange in cas ers Lumber elacisc durable used in furniture gum resin derived from wood. Over

species in genus mostly Australian Grevy (grait) Jules (1807-91) revy (grait) Jules (1807-91t Franch Blatesman prevident of Franch Pepublic 1879-87 resigned owing to standale involving his son in law in traffic in offices and decorations of honor

uecolatione of honor
frew Joseph Clark (born 1880) dip
lomal born Boston for many years
in U.S Foreign Service ambassado
fo Japan 1932-41 undersecrelary
of stale 1944-45 (Ten Yers u
Japan "The Turbuleni Eral) re lired 1915

Grew, Achemiah (1641-1712) Eng ish botanist born parish of Manceller worked on Isolation of chiorphyli cell (The Anatomy of Panie Henry George 4th Fort Albert um French u German u gem go thin then um Erguch nami (Joh) uh = French f is in szure), um berman gujural ch

Canada 1904-11 stimulated social end economic progress Gres Ciarles 2d bart (1764 1845) I nglish stafesman premier 1630-

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1 ropean politi e during that decade with Edward VII arranged

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lo prevent World War I sig-mally an electful in maintaining friently relations with neutrals during early years of the war ra-wed to perage 1910 tet purary ambassador to U S 1919

Grey Owl | Wa Sha Quon Autn) (1889-19:78) Canadan Apache Indian anthor annualist but widdle conclured Prince Albert Astonia Part | P grims of the Wid Sajo and the Ecaver People t C 87 pro lerr Y 82

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Orierance Charles Tamilinea (18841929) composer and planist born
Emira N Y work impressionislic
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Griffin rillin a mylhical creature half eagle half hon supposed to guard mvibleal creature half h dden Irsasure Griffly La Salle a ship L 104

riffili Arthur (1872 1922) Irish stalesman chef erganizer of Sinn Fein pres denl of Irish Free Siale 1922 I 2305 Griff lit Mari 1 Wark (1890 1949) motion picture director born

Grange I y began as slage and mollon picture actor became di reator then producer pioneer in erl st construction of pictures erist c construction of pictures first to place emphass by cut backs close ups (Birth of pictures Abraham Lincoln laik ing p clure) M 432

Griffith Sir Samuel Walker (184. 1920 Australian onservaliv chief justi e of Austral a 1903 20 Criffith I acl L s ange sa L 316 Griffon a hunting dog Bru se s toy dog color picture D 1165 table D 119

wire haired pointing table D 118 Grisnari (penjar) Viller (1872 1930) Fren hehemst born Cher Griguar I 1930) Fron h chem at born Cher bourg for die overlag Or ganden er revent used in synthesis an many organ comp unda he shared 1912 diel prize in chemistry with Paul valent er

Geljalin (6r6 halin) Juan de (14897 15-7) panish navigalor discovere of Mexico on ling firm Cuba when "panish navigator discoverer of Mexico en ling firm Cubs where his uncle Diego Velteguez was nis uncle lilego Veltaquar wa governor explorel Mexican coss es far as lera Crus artiva in con

quest of Nuesragua end a an there in an Indian oull real C 453 Gridelce River in sixtes of Tabaseo end Chiapas in as Mexico called called Chapts in upper course go mi long newgable for 90 an tas with Usumachia man M 195

Gril uze See in Index Architecture talk of ferms See in Index Architecture table of terms Criliparzer (gral part ser)

(1791 1379) (1791 1872) Austrian dramatic post a mader of dramatic lech n que works include classical dramas (The Colden Flesce a gy Sappho ) historical trage triogy

Grimal di Jecoph (1779-1837) fa mous Ingreh Cown Charles Dick ens ed ted his Memoirs

ens ed ted his Memoles Erimald's a prehistoric Negroid Face Whose Femans were discovered in e France associated with remains of the Cro Magnon race M 73 Grimes Bersan (1828-801 Confed state soldier born in P II County N C major of Fourth North Carly

lina Regiment in Civil War lina Regiment in Civit War made major general in 1e6 and served in lest ballies of Lees army rimm Jakob Ladwig Kuri (1785-1863) German scholar founder with his brother Wilhelm Karl

rimm Jakob Ladwig Kuri (1785-1863) German schrizt founder with his brother Wilhelm Kari (1786-1845) of sichare of friktors G 228 38 F 194 p.ct. re G 218 fathy takes L 271-2 8 41 pictares G 217 L 273 S 404 influence on storytelling S 495 G 84 The Bremen Town Musicians S 4086 falty

Bremen Town Musicians S 4056 Grimmrishusen (Grim such Nos sent Hans Jakob Christoff) von (1855\*-15) German writer and seven Jurer served in Thirty Years War The Adventurous S mpiclastinus realistic adventure story is based on own experiences and written in

on own experience and written in manner of plearesque novel Grime by or Great Grimsby seaport on se coast of England near mouth of Humber River pop 94 pop 13 562 textue and hoster milis canning plants for pimientos fruita and regetables U S agri

527; immense fishing trade; timber, coal trade; shipbuilding history dates from 8th century: map B-325 Grimsel Dam, in Switzerland, on Aar

River. See also in Index Dam, table Grinding machine, a tool T-153, 154

principle of grinding wheel C-178 Grinding tools T-153, 154 Grind of the Navir (Gate of the Giants), Shetland Islands S-148 Grindstone, a circular abrasive stone for grinding edge tools such as ax;

made to turn on axle; used dry or with water

cut from Ohio sandstone O-350

emery wheels E-339 Gringo (gring'gô), nickname for an American N-235

Grinnell', George Bird (1849-1938), writer, ethnologist, and ornitholo-gist, born Brooklyn; editor Forest and Stream 1876-1911; founded first Audubon society; author of a number of books on American Indians: S-418

owner, born New Bedford, Mass.; financed Franklin relief expedi-tions (1850 and 1853-55) and later Arctic explorations; Grinnell Land is named for him. Grinnell College, at Grinnell, Iowa; established 1846; opened 1848; arts

and sciences.

Grinnell Land, Canada, central part of Ellesmere Island, n.w. of Greenland; discovered 1850 by Grinnell expedition

expedition.

Griqualand (grilkun-land) East, a
native territory of Cape of Good Africa; 6602 sq. nil.; pop 360.775. Gris (grés), Juan (1857–1927). Spanish modernist painter and lithographer, born Madrid; moved to Paris 1905 and became identified

with cubist movement.

Grisel'da, figure of romance, famed for her patience Chaucer heroine, picture C-204 Chaucer neroine, pircitre C-204
Grisi (gré'sé), Carlotta (1819?-99),
Italian ballerina; began career as
child; made Paris debut 1840;
created role of Giselle in ballet
1841; popular in London where she
danced 'Pas de Quatre' with Tagiloni, Cerito, and Grahn In 1845: D-14h

Grisi, Glaila (1811-69), Italian dra-matic soprano, greatest of her day. Gris-Nez (grē-nā), ("gray nose"), Cape, headland of France, point of

French coast nearest Britain Grison (gri'sun), a weasellike car-nivorous mammal of family Mustelidae found in Central and South America and Mexico; dark beneath, light above; emlts disagree-able odor when it is annoved; its scientific name is Galictis, or Grison, vittata.

Grisons (Gré-zon'), easternmost and largest canton of Switzerland: 2746 sq. mi.; pop. 136,050; noted for superb Alpine scenery, especially in the Engadine.

See in Index Cartilage Gristmill, a mill for grinding grain

F-185

granite stones, picture F-166 17th-century mill, picture A-212 Griswold, Rufus Wilmot (1815–57), editor and author, born Benson, Vt.; in 1850 he helped to edit writings of Edgar Allan Poe, who had named hlm as his literary executor.

Grits, hominy C-484 Grizzly bear B-85, 86, 88, picture B-88, color picture N-282 enemy o b son B-200

Grizziy Giant, big tree S-102, Y-341b Groat (grōt) (from Dutch groot, "big"), name given to English sil-

ver four pence, historical value about 8 cents; term once applied to any large, thick coin.

any large, thick coin.

Grodno (prôd'nū), Russia, formerly
Gardinas (gār'dē-nās), former
Polish city, on Niemen River, Inciuded in Russia since 1945; pop.
60,000; interesting old buildings;
varied manufactures; known for commerce in grain, timber: map

Groenendnei (gro'nen-dai), variety of Belglan sheep dog, table D-118a

rofe (fro-fa"), Ferde (Ferdinand Rudolph von Grofe) (born 1892), composer, born New York City, member Los Angeles Symphony Orchestra; pianist and arranger for Paul Whiteman; exponent of "sym-Paul Whiteman; exponent of "symphonic jazz" ('Mississippi Suite'; 'Grand Canyon Suite'; 'Symphony in Steel'). Grogan, Edward Scott (born 1874),

British military officer and explorer, born Winchester, England; traveled through Africa. Australasia Americas, in collaboration with Arthur Sharp his traveling companion, wrote 'From the Cape to Cairo'.

Groln, in architecture A-309

vault, picture A-316 Groller (gro-le-ya'), Jean, vlcomte d'Agais, (1479-1565), French blbliophile and statesman; ambassador to Ronie and Milan and treas-urer under Francis I. collected library of 3000 beautifully bound books, Groller Club a club of book collectors in New York City named for him. B-241

bookbinding B-241, picture B-240 book collecting B-248

Grommet. See in Index Nautical terms, table

Gromweil, a genus (Lithosperman) of hairy plants of the borage family found in n hemisphere. Low-growing, hardy: flowers white, yellow, or bluish grow in leafy spikes; seeds small, pollshed, stonelike, used in rock gardens. Includes the puccoon

Gromyko, Andrei Andreyevich (born 1909), Russlan statesman, born near Minsk; ambassador to U.S. 1943–46; permanent U.N delegate 1946–48; deputy foreign minister 1946–49, chief deputy 1949–52 and after 1933; ambassador to 233; ambassador after 1953; ambassador to England 1952-53.

froningen (frô'ning-ĕn, Dutch krô'-ning-ĕn), industrial and trade city of n.e. Netherlands; pop 132,021; cattle and grain market; sugar refineries; university (founded refineries; university (foun-1614): maps B-111, G-88, E-424

Groot, Hugo de. Sec in Index Grotius Gropius, Walter (born 1883), German architect, born Berlin, Germany; in U.S. after 1937; director of Bau-haus, school in Germany (see in Index Bauhaus); professor and chairman, Dept. of Architecture, Harvard University 1938-52; exponent of functionalism; favorite building mentionalism; building materials glass, metal, and concrete.

Gropper, William (born 1897), painter and Illustrator, born New York City; skillful as social satirist; depicts realistically current happen-lngs, such as "The Last Cow", a

dust-bowl scene. Gros

os (ĝrō), Antolne (1771-1835), Fren Jean, Baron h historical (1771–1835), French historical painter; pupil of David; through Josephine was favored by Napoleon and is noted for Napoleon's power scenes; at end of Napoleon's power through the public classical embedded. turned to purely classical subjects; adverse criticism led to suicide.

Grosbeak, various stout-beaked birds

of the finch family G-218-19, picture G-218

black-headed, color picture B-184 food habits B-158 rose-breasted G-218, color plcture

B-184 Groschen (gro'shen), former Austrian bronze coin worth \$.0014; also former German silver coin, worth

2 cents. (ŷrō-zê-yā'), Groseilliers Medard Chount des (1621-84?), Intrepid French explorer and fur trader, brother-in-law of his companion Radisson

fur trade F-321-3, H-438 Minnesota M-280

Wisconsin W-178

Grosgrain (grö'grān), a firm, stiff, closely woven, corded stik. Gros Michel (grō mē-shēl'), a variety of banana B-48

Gross, numerical unit equaling twelve

dozen Grosse Pointe Purk, Mich., village ad-

joining Detroit on e.; residential suburb, pop. 13.075: map, inset M-227

Grosse Pointe Woods, Mich., village 11 mi n c of Detroit; residential suburb; pop. 10,381; map, inset M-227 Gross Glockner, highest peak in Hohe

Tauern in Tyrol region of Austria; 12 461 ft.: A-494 Grass national product (GNP) I-138,

chart I-138 Gross tonnage, of ship S-162

Grosswardein, Rumania. See in Index Oradea

Grosvenor (gro'ven-or), Gilbert Hovey (born 1875), American geographer, born Constantinople (now Istanbul). Turkey; with National Geographic Magazine since 1899; editor in chief 1903-54; president National Geographic Society 1920-54.

Gros Ventres (frō vān'tr-1), French name for Hidatsa or Minitari tribe of Piains Indians of Slouan stock on upper Missouri River in North Dakota.

Grosz (frős), George (born 1893), American artist, born Berlin, Ger-many; remarkable caricaturist; first noted as satirical painter, later as painter of nudes, still lifes, landscapes, and various birds.

Grote, George (1794–1871), English listorian and banker; his 'History of Greece' is "one of the few great comprehensive histories.'

Grotius (grō'shi-ūs), Hugo (1583-1845), Dutch statesman and jurist, "father of modern science of in-ternational law"; tomb at Delft:

Groton (\$\tilde{\rho}rq't\tilde{\rho}n\$), Conn., town on Thames River opposite New London; pop. 7036; U. S. Nary submarine base; site of Fort Griswold, where in 1781, about 800 Tories under Benedict Arnold massacred most of garrison of 150 colonial militiamen; map C-445

Grouchy (gra-she'), Emanuel, marquis de (1766-1847), French marshal, to whose delay at Waterloo Napoleon's defeat is attributed: W-68

Ground, in radio R-35

symbol for, picture R-40 Ground bass, in music M-460

Ground beeties, a group of the order Coleoptera, family Carabidae; especially the flery searcher (Calosoma scrutator), one of the largest beetles; if held carelessly will discharge quantitles of "fiery" discharge quantities of "fiery" julce: B-108, ptcture B-105, color plcture I-154d

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A 534 diagrams R 27 Sec also in
Index Aviation tible of terms

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table of terms Graundmuss in petrology R 169 Graund nesti te lermits T 74 76 Groondant name for peanut and other emilar nuts P 104

Ground Observer Corps (Operation Ekywatch) e joint activity of U S Air Force and Civil Defense Admin istretion organized 1852 to detect

ches to the country of the country o

Ground raities nake or pigmy raities nake R 78
Groundsel S genus of pients of the composite family See is Index

reunded cemmon a low growing ennual weed (Senerio sulgaris) of the femily Composition with leasty branching etem leaves pinnate and toolhed flower heads yellow also applied to entire and applied to the Groundsei

applied to entire senue Senecio ( raund agolerel name given to various aguirrel like rodente that live on the ground S 3590 source of aprings

Geonnd water E 161 S 357 Graundwood pnip in papermaking P 66-7 71

Croup United States Air For e A 80 Grouper name given to southern members of the sea best group large vorscious fishes with small scates and pule fish among com-monest are Navani grouper red monest are Nassau grouper red grouper or mero yellow in grouper jownsh red hind and rock hind

E 104 Nassau grouper ptoture P 420 Group insurance I 167 S 2180

Group insurance I 167 S 2480
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Groups G 219-21 pictures G 220
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courteh p G 220 pi fures B 172
G 220 G 220 ruffed grouse etate bird fable B 158 Grant a kind of concrete C 431a-b picture C 431b

Grave Frederick Philip (1872 1948)
Canadian novelist, noted for his
realism (Sottlere of the March
Our Daily Bread) C 1080

u=French u German u gem fo thin faen nu French masai (Jeac) gh=French f (s in azure) x=German guttarat sh

I ah engineer and writer on must erected | whthouses in West Indian director Royal Cotlege of Music lro 1 its foundation 13\*2 to 1894 editor in ablef Distinguished Music and Musicians a those Buethoven and H s Nine Symphonics

Crave Nie William Robert (1811-96) Engitch physicst and judge venled Grove bullery author author of The Correlation of Physical Forces

Grove City College al Grove City Pa. Presbuterian founded 1878 art arte itou music

Groves Leslie Rielard (born 1698) Il S Army offi er born Albany N Y mitstary director Vanhattan mittary director Manhattan Proje 1 who h deve oped atomic bomb ret red 1848 table A 484

Graw Gainsia A (18°3-1907) politi sai leader bara Ashford Conu U S c ngressman 1851 83 Speaker of House 1861-63 introduced first homestead but

Graving sensons Europe map E 428 United States map U 247 Growth Increase n oil bin hem cal pro c cell division C 191 cm B 148 cht d development See in Index Child

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food factors F \$16-27 glands affect H \$26-5 plant, promoted P 396-7 repoint in promoted P 396-7 trees marked by rines ampliant protest provid by Knut Hamesun picturing Norweelen peasant Hfs Grand R 36-6 Urich oil fields map P 47 GR 8 (Government Pubber Styrene)

R 248 Grab larve of leets B 104 Genber (graber) Frans

(1787 1863) Austrian organ at, born Upper Austria known as the com Upper Austria known as the com poser of Stile Nacht Hellige Nachi (S eni Night, Holy Night) Grubstreef defined by Dr Joinson T 441 Grue sherg Louis (born 1884) Amer

ican composer born Russia brought to United States in baby hood developed from planist into composer chiefly of syncopated im press onistic ( Emperor Jack and the Beanwalk

prese onissie operas. Lumpelve planes afaire and a Jaxx Sull's all.

Greether (gran the') After Myes a millian) (born 1881) US Array (solid planes) (born 1881) US Array (soli mander 1953

mander 1853Geo gro ant edib e fruii of the gru
gru palm of South Amer ca and the
West Indica source of valuable tol
sometimes used for beads N 317
Grolfornes (Gro I for mas) au order
of marsh birds comprising craces,

of marsh birds comprising craces, funpkins ra te gattimites coots Granditys (grbattes) Mkolai Frederik Saveria (1783-1872) Dac ab poet, philologist and theologism born in Zealand advocated re

Grindtyle pipe organ charch Copen hagen picture B 348 Grundy Mrs the personification of society a judgments name ortgi nated in old p ay Spred the Plough where a character asks conti nally

Helous and civic Ireadom collected

Danish lok songs (Acribert My thology a study of Old Norse The Decline of Herele Life in tha

North a long spic poem) Danish folk schoo s D 70

where a character asks continuity What will Mre Grundy say?

Grünewild (Grune vitt) Matthias (1483-13)\*9") German patter of lale Golbic period powerful color brital realism strong emolion (the leathetm siter Cruc fixions)

Granton (gryn yo's) small stender that (Le rethre tousis) of where

fish (Le cether tousis) of silver mides lan ty (Atheristice) thrives along sandy coasts of California from Sun Francisco to Lower Cali lornia F 198 Gro t a large family of food fishes (Hasmul doe) of tropical seas The

make a grunt ng noise Gr to (the Crane) a constellation cl act 6 878

Cracts Syru yer') cheese C 207 Gruyères Switzor and p cturesque to vn perched on a high h | 16 mi g of Fribourg po | 1656 famous for its changes

of Finours Del 1456 Emmous nor of Finours Del 1456 Emmous nor de Gardinara (p. 600 f. 150 f.

Gaadatamai (p.000 i.g. ni) one or the Solomon le 90 mi long about 20 mi wide chiefly mountainous See also in i dez Solon n Iokanda World War II W 299 287 map P 19 Guadaiquirie (p.000 i.k. v er) (Ar

undaigulti (fuod iku ofr) (Ar able great river) river in Spain \$50 ml long rises in e of province of lace flow as w through evile and Cordova him Atamic Ocean 20 ml n of Cadis E 108 wace B 312 F 223

mace 8 312 Figs.
Guedatone (food 1 p 5 an shows
that by a) Mexican 1 and in
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Gundatape-Hidags (pica the Is pd c 660 60) Mexico town 3 ml n of Mexico City where treaty was Mexico City where treaty was aloned 1648 ending Maxico City where treaty was aloned 1648 ending Maxicon War receiv terms 11 188 pp. Moontains New Mexico and Treas between RIVer Mexico and Treas River maps N 170 12 97 Grafish Caverna National Park Copy N 12 1 color phinary N 28 Constates Caverna National Park Copy N 12 color phinary N 28 Constates Park Copy N 12 Copy N

map N 18 Guadatupe Peak or Et Cupitan highest point in Texas (6751 It) In Guada jupa Mountains map thest T 91 pict re T 79

pict re T 79

Gondalups Etver Tex., risse in s.w.
central pari and flows so to point
shout 20 ml from Gulf of Mexico
where it divides one branch unit

ing with San Antonio River, and other emptying directly Into San Antonio Bay: map T-78

Gundeloape (ğıcód''l-up, French ğıcàd-lup'), French overseas department in West Indies; total area, 688 sq. mi.: pop. 276,464: G-221, maps N-251, W-96a

Guadiana (ŋicā-dē-ā'nā), a river of Spain and s.e. Portugal; about 500 ml. long, navigable for only 40 ml

from mouth; flows into Gulf of Cadiz: P-378, maps S-312, E-425 Guniac (fwlak), a resin obtained from the lignum vitae or gaiacum, a tree native to the West Indies and

northern South America, Gunlra (giri'rā), or Gunyra, Fulls, at head of navigation, Alto (Upper) Parana River, between Brazil and Paraguay; the Parana is about 3 ml. wide at crest of falls and pours over ledge in 18 separate cataracts (highest, 130 ft.), combined average flow of these cataracts is far greater than that of Niagara.

Gunira, La, Venezuela Scc in Index La Guaira

Guam (@udum), island possession of I'. S. in w. Pacific 225 sq ml.; pop. 59.498; cap. Agana: G-221, N-82, P-3, 11, maps P-16, A-531, W-205 flag F-130b, color picture F-127

Guan (jurga), a turkeyake bird of Central and South America, belonging to the same family as the curassow; it has dark creen or black plumage, a long graceful tall, and a throat almost bare and usually with a pendent wattle; one species, called the "chachalaca" from Its caneu the "chachalaca" from its harsh loud ery, ranges n, through the state of Texas, many of the guans ean he tamed.

Guannhacoa (grā-nā-bā-kō'ā), town in Cuba, 6 ml e. of Havana, pop. 112.220, with suburbs; summer re-

sort; medicinal springs: map Guanaco (gucă-nă'kō), wild wild South American ruminant L-285

hide used, picture S-259 Guanajunto (Jucă-nă-lucă'tă), state In central Mexico; rich in sliver and Grana heato other minerals; 11,804 sq. mi.; pop. 1,324,669; cap. Guanajuato: map M-194-5

Guanajuato, formerly Santa Fé de Guanajuato, Mexico, historic city 165 mi. n.w. of Mexico City; pop. 23,390; capital of state of Guanajuato; gold and silver; first battle in Mexican war of Independence fought here in 1810; map M-194-5 Guanchos (jūcān'chāz), Hamitic people, natives of Canary Islands, originally tall, blond, athletic, but later mixture with Arabs changed these characteristics; hy language allied to ancient Numidians. Guanajunto, formerly Santa Fé

allied to ancient Numidians. Gaano (gira'no), a fertilizer formed by the excrement and carcasses of sea birds; composed of phosphoric acid. nitrogen, and potash; name also applied to other manures, such as bat or fish guano

hat B-78

Paeifie Islands P-12

penguin P-120 Peruvian islands S-276, picture S-259 Guantánamo (ğıcan-ta'na-mo), Cuba Guantanamo (guanta na mo), come, town on Guaso River near head of fine harbor on s. coast; pop. 124,428, with suburbs: maps C-528, W-95 Guantanamo Bay, Cuba, U. S. naval base N-82, map C-528

Guaporé, Brazil, territory, created 1943 from parts of states of Amazonas and Mato Grosso; area about 95,000 sq. mi.; pop. 37,438; cap. Porto Velho: B-291

Gnarani (ŋwā-rā'nē), tribe of South American Indians; their descend-ants form bulk of population of

Paraguay and Uruguay, and are Important element in Bollvia and Brazll: P-77

Gunrani, monetary unit of Paraguay, historical value 3314 cents. Guarantee, in law. Sco in Index Law, table of legal terms

Guaranteed unnual wage, in labor L-70n

Gunrdaful (gwár-dä-fwé') promontory of Somalliand at cn-trance to Gulf of Aden; lies n w. of Ras Hafun, the casternmost point of continent of Africa: maps A-46, E-402

Gunrdl (gicar'de), Francesco (1712 93). Italian artist of late Venetian

school; Venetian landscapes. Guardian, In law, name ger given to one who has control of person and property of one under years, also to one who has control of person or property, or both, of one unable to care for himself, as a

lunate, drunkard, etc.
Gunrding the Treasure, a game G-8b
Guards, Ruyni Horse, Eng and L-303,
map L-301, picture L-305
Guarini (Gica-rc'ni), Giambattistn

(1537-612), Italian poet, wrote 'il Pastor Fido', like Tasso's 'Aminta', on which it is patterned it is a lyric conception of the ideal life; identifies happiness with simple rustle life, 'Il Pastor Fido' and 'Aminta' are the finest pastoral poems in Italian literature.

Guarneri (gicār-nā'rē), Guarnie'ri, or Guarnerius, famous family of Italian violin makers 17th and 1eth centuries, of whom most celebrated was Giuseppe (1687-1745) · V-476 Antonio

(1864-1743) V-476 Guatemala (ģicē-fā-mū'lā), republic of Central America; 42,042 sq ml.; pop. 2,788.122; cap. Guatemala City; G-222-222c, V-344, maps C-172; N-251, pictures G-222-222c. See also in Index Central America

agriculture of highlands G-222a-b architecture and art, pictures G-222c, L-115

climate G-222, 222b clothing G-222, 222a, pictures G-222-222b, C-174, L-117 dolls D-122

earthquake of 1917 E-196 education G-222c farm land, pleture C-173 flag F-138, color picture F-136 forced labor G-222a, C-174 government G-222c history G-222c, C-176 literature L-127 manufactures G-222b

marlmba players, picture L-117 Mayan civilization M-143a-1, I-110, G-222c: Ilmestone carvings at Piedras Negras S-76, picture S-76 natural features G-222, 222b, picture

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products and resources G-222a-b, picture B-44

nettine B-12 relationships in continent, maps N-245-6, 248, 250-1, 258 shelter, pictures G-222a, c, C-174 transportation G-222b, c

transportation G-222b, c
Gantemala City, capital of Guatemala,
railroad and commercial center;
pop. 284,233; 50 mi. from Paclific
coast; textlles; pottery: G-222,
maps C-172, N-251
earthquake of 1917 E-196
Gantemoc (fwä-ten'6b), also called
Guatemogin or Capabitame (1907)

Guatemoc (yud-tem or), also called Guatemozin or Canultiemoc (14957-1525), last Aztec emperor; nephew of Montezuma II; bravely resisted Spanish but was captured and executed for treason: C-489

Guava (gwā'va), a small fruit grown In tropics F-304

In tropics r-304 Gunrlare (gueã-vé-ä'rá) Elver, Colom-bia, about 650 mi, long, rises in Andes, flows e. to Orinoco River; partly navigable: maps C-387. S-252

Gunynaull (gici-ya-kel'), chief seaport of Echador. South America; pop. 258,966; large foreign trade; ship-yards: E-232, S-258, maps P-164, Sec. 25.2

temperature E-230 Guayaquil, Gulf of, large inlet of Pa-

clfic in Ecuador; over 100 ml. wide at Its mouth; narrows into estuary of the Guayas River: E-230, maps

P-164, S-252 Gunyns (gici'äs) River, in Ecuador; rises in w. Andes and flows s.w. into Gulf of Guayaqull; partly navi-gable: E-230

Guay mas (girl'mäs), seaport of Mex-lco on Gulf of Callfornia; railroad connections with U. S.; pop. 18,816:

connections with 0. 2., pop. 2012, maps M-189, 194
Gunyule (yud-yo'ld, or wi-yo'ld), a perennial shrub (Parthenium argentatum) of the aster family G-222c-d, picture G-222d

Gubbin (306'yō), Italy, pop. 7432; 18 inl n.w. of Perugia; famous ln Renaissance for malolica ware; still being made.

'Gudrun' (Jod'ron), a German epic poem of the Middle Ages, in three parts, full of sea adventures and battles. Gudrun, a princess, is car-ried away by the king of Normandy and held prisoner for 14 years, when her brother and Herwig, her

when her profiler and He wig her true lover, rescue her. Gnebers. Scc in Index Ghebers Gueinlin (gc-däl'ig), Philip (1889– 1944), English biographer, historian, lawyer; combined sparkling, and lawyer; combined sparking, witry style with sound scholarship ('The Second Empire'; 'Conquistador'; 'Gladstone and Palmerston'; 'Bonnet and Shawl'; 'The Hundred Years'; 'Mr. Churchill').
Guelf (@icēlf), Honse of, Hanoverian rulers of England. See in Index Hanover, House of Guelfs (@icēlfs) and Ghibellines (@ibēlfs), political factions of medle

č-l'ns), political factions of medle-val Germany and Italy G-222d Dante exiled by Guelfs D-14n Florence F-148 Otto IV. a Guelf O-430

Otto IV. a Gueli 0-330 Guelph, Ontario, city about 45 mi. w. of Toronto on Speed River; pop. 27,286; Ontario Agricultural Col-lege and Macdonald Institute; annual stock show; foundry products. ruhher goods, sewing machines, farm machinery, and linen: maps C-69, 72

Guemal (gicā'mal), also huemal, Andean deer D-44

Gaenevere. Scc in Index Guinevere Guenou (gū-nou'), an African monkey; species commonly used by organ grinders and also as pets: M-351

Gueret (ga-re'), France, historie town 38 mi. n.e. of Llmoges; 15th-century mansion: map F-270

Cuericke (yū'rīk-ū), Otto von (1602-86), German physicist; studied law and mathematics in Germany and

Holland: E-307 Guérin (ya-ran'), Georges Maurice de (1810-39), French verse and prose writer; vivid, original style; works colored by Intense love of nature The Centaur', specimen page, pic-

ture B-239 Gnérin, Jules (1806-1946), painter and illustrator, born St. Louis, Mo.; had charge decorations San Fran-

ciseo Exposition 1914 (decorations Key: cape, at, far, fast, what, fall; mê, yét, fern, there; ice, bit; row, won, for, not, dg; care, but, rude, full, barn; out; for Lincoln Memorial Washington D C and Pennsylvania Pairced station, hen York City; Guern Diedlane Ras cupe (188 ) on Mediterrangan n Tunisia aw of Bizerle northernmost point of con tinent of Africa (27° 20' 53' 22

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Guerrero (ga-ro ro) Virenta (175º 1831) Vexican revolutionary here president of Mexico 1829 when forced to rate put up orned re-elatance but use finally captured and shot Mf 206 when finally captured

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American writer of verse born Bir minghen 1 ngland came to U S minghen I neland came to U S
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1835 immentely pupilar for more
eeffour versa dealing with everyday
life also for himorous ters and
electric Just Folks' When Day
to Done All That Matters )
Ourgenheim famous family of Ameri saganielm famous familir of Amesti
can midnig capitalies industrial
can midnig capitalies industrial
shown are Henhamin (1833-1913)
Simon (1867-1941) U S senator
from Colo (13051-11) wano saish
trom Colo (13051-11) wano saish
trom John Simon Manled (1853
con John Manled (1853
con Joh

Gaggenheim Foundallon Ses in In der John Simon Guggenheim Me n orial Foundation

n orisi Foundation
mians (\$\delta\$ and a region in ne
South Atterl a comprising Brillei
Cuista (\$0.000 sq ml pop \$75
701) Surinari elso called Dulen
Guista (\$4.500 nt nl pop \$25
000) and French Cuista (\$4.50
000) and French Cuista (\$4.500
000) and French Gnisns 8 270 man G 223 S 252 1 aleigh a expedition to B 73

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Hundred Tears War II 445 448
Guignol (\$\vec{\text{fr}}\pi \pi \pi \pi \text{ord}) name given by
French to man character in \$\vec{\text{fr}}\pi \text{ord}

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Gnilbert (felber) heits (18591944) o Parisum singer uneur
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humorous rendition of old builded
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Gallilee fre in Index Florin Guiden Cullishant old council hall in Cheap a de I ondon severely damagel by sombe in World War II many statues damaged and wooden figures of Gog and Magon desiroyed resto 7. 301

Culid socialism C 427
Guilford College at Guilford College
NC founded 1837 by Society of Friends arts and sciences Guilford Cauribause N C ele of baille Murch 1981 beineen Greene and Cornaills 5 ml aw of

and Cornalls 5 ml aw of Greensboro made national military park in 1817 Gullianne ipc pôm ) Charles féorera (1861 1938) French physicist in venice of invar 1920 Nobel price v mer in chastes

unner in chiudes Outlement (§ 16-mol) a bird of the abk family A 4725-3 age piezyr B 288 Galliellas (§ 16 ctm) French instru-ment of execution F 283 Gallement (§ 6 mou 1 F 611 accundra (1237-1911) French berget at and

composer particularly of works for the organ for more than 30 yests organist at church of the Trinky to Paris

Gaimarnes (de ma raish) Portugal dimarnes (pr visi taken) Portogni lown as mi ne of Porto birth place of first king of Portugal known also for h storical buildings and fortifications map II 425 alnes (g x 1) const lange of w Galnea (q % 1) Africa from Gamb a on n to equalor on a in broader sense the coast lends from Gambia to a boundary

of Augola, Galues a former English gold coin so named because gold of which it we manied because goes of which it was coined cause from Guines Coast of w Africa term atill used as money unit (21 shillings) Gaines French Sea is Index French

Gninea Gnit of on w coast of Africa moss A 48 42 Gaines, Fortiguess See in Index

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Culnes habons B 2 Gulnes fewi G 2184 picture Q 2284 Culnes grass M 255 Culnea grass M 255
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romance Arthur s beauliful, unfaithful queen R 236

Gellary | grail) Laula Imogea (1861-19 0) post born Bosion (The Walle Sall and Olher Poems. Happy Enging ) pinness (g n cs) ) Alee (born 1914) horn London Eng

English negor roles include Hamlet Herbert Jano Folce include Hambet Herbert Pocket in Great Expectations the Daubhin in G.D. Shaws SI Joan and Pey hiarit in T.S. Diols a The Cocklail Peris, (on Broadway 19 0) also starrel in motion pic tures (eight portrivals in kind Flearls and Corongs Distant in

The Mudlark The From ler ) ils and Rolert & Cla I : for Robert Culs and Guiscard Cular (gen) French ducal family brinch of house of Lorraine whose heads led extrems Calholic parly

and asplied to snatch crown from hause of Boarbon Enlare of Boltanon and Massacre of the Balafré (the Scarred) inclied murder of College and Massacre of

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th lar (6f for ) a stringed musical natrument G 228d yieture M 471 Cullenu (pc lo) Charles 11940-82) Amprican lawyer assays n of President Shrield G at Gullerman [5 f Fr p 34] Arthur (1871-

ullegman (§ 18 r. ow). Aginer (18 r. i. 1948) Amer an writer born in Vianna of American percela brought to New York at east 7 on ed lorisi etaff of Wos on a Ron s Conspansor. Livrey Port et author of hallade lyris humorous stree (Chipe of Jada J Yng the Pionest Wild vood Tables ong Vindian Chipe (§ 19 on 19 on

Pioner Wild tood l'ables 'Ong and Laughter) wrote brette of opera Men Wilhout a Country wittry (pe fro ) I selan Garmain (1850-18-4) French actor ong of gresset French interpreters of mudern realists drema his son Sacha (born 1850) noted as writer of comedies dramats bloaranhes also as molion nicture actor producer

producer

«tist (pf to ) François (11811874) French statemat and ble
torien heal of mustry under
Louis Philippe (H story of Civil ration in Durope) L 521

«tilstansen Teyrus (horn 1894) Norwegi'n novelis | Beyond Sing
the Wooda ani The Wind from the
Monnilum; chronicles of life on a Galbranteett

menor in forests of youngs Guiden (ful den) monetary un 1 of the former free city of Panuls equal 10 a 2-th part of an English

ourd sterling and nomina ly world about 33 cents also formerly used in Austria and Bavaria (worth when current about 48 and 41 ceuta respective y) the Duich guilder is also tailed guiden Guies (\$212) in hersidry H \$41

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land See in In lex guils by name
Guif Coasis) Plain See in Index
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Sound Gulf of Mexico 12 ml w of Bilori pop 22 659 d-epwater harbor resort area whire forest products pharmaceuticals tung of ferillizers aluminum pipe food processing Gulf Park College US

Veterans' hospital: maps M-303, U-253

Gulf Stream, a warm-water current flowing from the Florida Stralts across the Atlantic to northern Europe G-228b, O-335-6, mups G-228b, O-335 cause of G-228b, O-332 fog caused by O-336

Gulfweed, a seaweed with air-blaoder floats S-94

Gulick, Luther Halsey (1865-1918), American educator and writer, american educator and writer, born Honolulu; organized physical education in Y. W. C. A. and in New York City public schools; editor physical education magazines; with mile form. with wife founded Camp Fire Girls: C-54

Gull, a long-winged fish-eating bird G-230-1, pictures G-231, color picture B-179

California gull, state bird, tuble

B-158 length of life, average, pictogruph A-249

cricket plague Mormon U-410, C-513
Gullet. See in Index Esophagus

Gulliver's Travels', satire by Jona-than Swift, first published in 1726 G-229, S-468, 470, pictures G-229 Gnllstraud (pul'strand), Allvar (1862-1930), Swedish ophthalmolo-dist and physicist, arm. Nobel mis-Gnllstraud gist and physicist; won Nobel prize in medicine (1911) for work in optics.

Gull wing, airplane, picture A-82. See also in Index Aviation, table of

terms

Gully, small valley E-188

Guny, small valley E-188
Gnm arable, gum from acaclas G-232
Sudan chlef source S-442
uses: antidote for phosphorus
P-341; candymaking C-112; medieval manuscript ink B-232; photolithograpby P-210d
Gumbinnen (6µm-bin'én), hattle of
(Aug. 19-20, 1914) W-221, mup
W-202

W-222

Gumbo. See in Index Okra Gum camphor C-55

Gumdrops C-112
Gums, substances obtained by drying sap of various plants; distinguished from resins by their solubility in water, but term often applied to resins: G-232

acacia A-4, G-232 amber A-186, picture A-186

camphor C-55 chewing C-227 corn C-484 mesquite M-175

perfumes P-148-9 varnish V-439, G-232, P-41 Gum senegal A-4

Gum trees, pictures T-180, 182-3 eucalyptus E-412-13, pictures A-479, E-412

wood G-232, table W-186c

Gumwood, wood of various gum trees, much used for furniture G-232 woods known commercially as gum G-232, tuble W-186c Gun (weapon). See in Index Artil-

lery: Firearms; Machine gun Gun bronze. See in Index Gun metal Guncotton, an explosive made by treating cotton with nitric and sul-fnric acids E-457-8, C-163, tuble C-162

Gunga Din, in Rndyard Kipling's poem, 'Gunga Din', faithful Hindu water carrier, who dies succoring

his master.

Gun-metal leather L-149 Gnon, Jeannie Taylor (Mrs. Aeneas James Gunn) (born 1870), Austranovelist, born Melbourne, lian Australia ('The Little Black Princess'; 'We of the Never-Never').
Gunuarsson, Gunnar (born 1889), Icelandic novelist; 'Ships in the Sky' and 'The Night and the Dream' are autobiographical.

are autobiographical.

Gun'nison River, in w. Colorado, rises in Rocky Mts and flows n.w. and joins Colorado River at Grand Junction; waters diverted through Gunnison Tunnel for irrigation purposes: maps C-402, 408, C-414b national monument N-30, map N-18 Gunnison Tunnel, for irrigation, from Gunnison River e of Montrose, s.w. Colorado, maps C-408, C-414b Gunnison River e of Montrose, s.w. Colorado, maps C-408, C-414b Gunnison River e of Montrose, s.w. Colorado, maps C-408, C-414b

Gunny, coarse sackcloth jute J-368

Gunpowder G-232-3, picture G-232 ammunition A-236-236b, pictures A-236-236u

black powder G-232-3, A-236a: bullet, picture A-236u China, early use in C-279

explosive force E-457 feudalism ended by F-62

smokeless powder G-233, A-236a Gunpowder Plot, English conspiracy (1605) F-46

Guopowder tea, picture T-29 Gun power, military and naval. See in Index Fire power

in Index Fire power
Gun salutes. See in Index Salute, tuble
Gunsaulus (gun-sg'lus), Frank Wakeley (1856-1921). Congregational
clergyman, born Chesterville, Ohlo;
pastor Central Church, Chicago; president Armour Institute of Technology, Chicago, noted lecturer.

Gunter, Edmund (1581-1626), English mathematician, invented "chain" for land measurement, devised logarithmic scale (1620) on which

slide rule is hased.

Gunter chain, used in surveying S-458 Guntersville Dam, in Alabama about 25 ml. s.e. of Huntsville A-118, map T-69

Conther, John (born 1901), journalist, born Chicago, Ill.: represented Chicago Duly News in Europe for 12 years: 'Inside Latin America', and 'Inside U.S.A.' are panoramas of the control 'Inside U.S.A.' are panoramas of events with vivid portraits of leading personages; 'Behind the Curtain' is about Russia; 'Roosevelt in Retrospect'; 'Riddle of MacArtbur'; 'Eisenhower; The Man and the Symbol',

Gunther (fun'ter), in 'Nibelungen-lied', king of Russyndians N. 222

lied', king of Burgundians N-232, S-177

Gunwale. See in Index Nautical terms, tuble

Günz (ğūnts), a glaciai phase I-5 Günz-Mindel, interglaciai period I-5 Guppy, tiny, multicolored fish

(Lebistes reticulatus); native to Caribbean waters: A-281, P-185,

Caribbean waters: A-281, P-185, color picture F-104-5
Gurgan, Iran. See in Index Asterahad
Gurkhas (gpr!rix), military people of
the Rajput race N-110
kukrl (sword) S-485, picture S-484
Gurnard, medlum-sized fish of the
family Triglidae; bony-plated head;
several detached fin rays used as
feelers; family includes the sea
robins: F-102
Gurn, teacher particularity of the

Guru, teacher, particularly of religion in Sumatra S-449

Gus, Uncle. Sec in Index Rey, Hans Augusto

Gusher, a spouting oil well P-172 Lucas gusher P-180

Gusta'rus I, Vusa (1496-1560), king of Sweden, fonnded Vasa dynasty; made king 1523 by Swedish peasants

on expulsion of Danes: S-465 Swedlsh flag, origin F-136c Gustavus II, Adolphus (1594-1632), king of Sweden G-233-1, S-465-6, picture G-233 develops army W-10, G-233 Gustavus Adolphus Day F-59

Gustavus III (1746-92), king of Sweden 1771-92; by a bloodless revolution, regained regal powers lost by his predecessors; instituted needed reforms, but was assassinated through conspiracy of nobles: wrote excellent historical essays.
astuvus IV (1778–1837), king

Gustavus IV (1778-1837), king of Sweden 1792-1809; son of above; his violent hatred for Napoleon led him Into coalition against French and into disastrous war with Russia: his subjects, convinced he was insane, dethroned him and denied crown to his descendants; died in poverty in Switzerland.

Gustrus V (1878-1950), king of Sweden 1907-50; succeeded father, Oscar II: S-466 Gustrus VI, Adolphus (born 1882), king of Sweden: great-greatking of Sweden; great-great-grandson of Napoleon's marshal, Jean Baptiste Jules Bernadotte, who founded present reigning house in 1810; succeeded father, Gustavus

W (Oct. 1950).
Gustavus Adolphus College, at St.
Peter, Minn.; Lutheran; founded
1862; arts and sciences.

(øg'tén-bérk), Gutenherg (1400?-1468), German Inventor, traditional Inventor of printing traditional Inventor of G-234-5, from movable type: G-2 P-414d, pictures G-234, I-202 Frankfort honors F-279 press, picture G-234

Gutenherg Bible. See in Index Fortytwo-line Bible

Gnthrie (Jüth'ri), A(Ifred) B(ertram) (born 1901), writer, born Bedford, Ind.; known for novels of the West ('The Big Sky'; 'The Way West', Pulltzer prize 1950).

Guthrie, Samuel (1782–1848), chemist, born Brimfield, Mass.; first to produce percussion powder servers. Gnthrle

produce percussion powder suc-cessfully; invented punch-lock process for converting potato starch into sugar; one of three independ-ent inventors of chloroform.

Guthrle, Thomas Anster (1855-1934) (pseudonym F. Anstey), English novelist, born London; stories humorons and fanciful (Vice numorons and fanciful ('Vice Versa', satirical novel; 'A Long Retrospect', autobiografity

Retrospect, autobiography).
Gnthrie, Okla, city 30 mi. n. o.
Oklahoma City, on Cimarron River pop. 10,113; in agricultural and oil region; cotton mill. iron foundry, railroad shops; Catholic College of Oklahoma for Women: maps O-371, U-252-3

Guthrum (goth'rom) (died 890), Danish chief, king of East Anglia

Alfred defeats A-152

Gutférrez (go-tē-yā'rāth), Antonio García (1813–84), Spanish drama-tist of romantic school.

Gutlérrez (go-te-ya'ras), Bernardo Bernardo (1778-1814), Mexican patriot, born Quanajuato; led filibustering expedition into Texas with Augustus W Magee (1812-14).

nts Muths (guts' muts), Johann Christoph Friedrich (1759-1839), educator, born Quedlinburg, Prus-sia; founder of German system of Gnts school gymnastics.

Gutta-percha, gummy substance resembling rubber G-235

Gutzkow (guts'kö), Karl Ferdinand (1811–78). German dramatist and novelist; a leader in "Young Germany" school, revolting against all traditions ('Uriel Acosta'; 'Die Ritter vom Geiste').

Gny'andot River, rises in s.w. W. Va. and flows n.w. 150 mi. to Ohio River, mups W-100, 106 Guy Fawkes Day (November 5) F-46

GUY --Monnering novel by Sir Walter Scott S 69

Guynemer (den mer') Georges [1894-1917) French avistor brought down more than 50 enemy machines before his death

Onyot (56 y6) Armsid Henry (1807 64) Swiss American naturalist geographer and geologist profess sor of physical geography and geog raphy Princeton University after his meleorological observation led to establishment of U S weather

to establishment of U S weather bureau (Earth and Man Meterotogical and Environ Tablem).

Mis on North Carolinas S-moky Mis on North Carolinas S-moky border (822) H) map T gr (1870-69) Venezuelan dictat r (1870-69) was de fit president by revolution

taru promote i edu alim und im-proved economic life Gwallor (fren i or) India ancient city white captai of Madhya Dharat stale previously capitai of independent Gwallor siate pop 24 577 a of old city liea new navi 1870 promote i edu alinn and im

a of old city lies new pari wallor called Lankar of Gwaller (lush Lur)

Gwedne (fus duk) also geoduck (fit 6-duk) or goeduck (fus duk) a clam C 33 Gwinnett Buttan (1732-77) signer of Declaration of Independence as Georgia delegate born Engand killed in duel by Gen Lachian

McIntonn a political of Mgnature reproduced D 37 Gwyn or Gwynn Nell (1858-87) Eng

tish actress favorite of Charles If her wit, generosity and kind ness endeared her to the English Gyges (groes) in Greek mytho gry hundred landed giant flung into

Tartarus for warring on gods

Tarfarus for warring on god; yers king of Lydia 17th century yer king of Lydia 17th century yer) possessor according to leg end of magic ring that made the wearer invisible with ita aid in kittot the reigning king and usurped his throne Gymnasiam (gim na zi um) a schoot

American co lege compared C 385 ancieni Albema A 5 German s huol A 5

Gymt as the as I gymngelens P 227 228 See ho n Index Athletics ac Ident presenting S &

ac idem prevention 48
Symmosperma (gr no apirma) d
vision of flowering plants whose
seeds are not protected by a
need cost P 240 295-4 T 125
pt fare S 87 Reference Gutture
1 245 El 265

Gynerology (giu a kél é gi ar ét né kél é gi) in medicine M 1844 Györ (gyür) formerly Rash Hun

oyor (33m7) formerly Rase Hom gary town at confluence of Rash and Little Danube rivers 65 mil w of Budspest pop 55 200 for mor fortress machinery cuttery oil farm trade map 4 25 Gysauphila See is Index Babys bresih

- HABIT Grysum (gps m) a soft m neral

uspally white G 236
crystal picture C 525
relative hardness ht 261
tises G 236 cements

remaise nardness hi 281
1888 G 236 cemenis C 185 186
picture C 184
varieties G 236 M 265
white sand of Nev Mexico S 38
Gypsym Carr near Las Vegas Nev

discovered 1824 also gipsy G 235-6 picture G 231 books about G 256 caravan pictura G 238

Gypsy moth a moth of the silkworm fam by B 367c control by parasites 1 165 e m damaged by E 335 forest nfeelalion F 239

Garfalton or grefoleon | gar fol kon) H 292 Gyrs directional in aviation A 93 85 Gyra vertical in aviat on A 95

Gyrocompass (p ro kom p(s) G 238 picture G 258 Gyra intrinon or artificial horizon in a inilon A \$2 N 77

Gyrapilol See in Index Autopilot

Gyrapeopa (g'ro skop) G 237 \$ pic

fures G \*57 H in Aviation A 83 95 precession G 237 d agrom A 441 atabi izers on ships and airpianes

torpedo sisered by T 158 Gyras (pyras) convoluted ridge be tween groo as convolutions of bra n D 280

Egyptians did

Our LETTER H probably scarced as an Egyptian picture which means a hank of flax (1) Soon after 2000 B C 2 Semitic people called the Seiritet adopted it as an alphabetic sign for a peculiar throaty pronunciation of clt. Probably they did this because to them the sign looked I ke bandages or a dressing and their word chattl for dressing' began with this sound. They made the sign (2) much as the

Later the Canaantte Phoenician alphabet gave the sign two forms (5) In Hebrew the s gn was called cheth and other Semitic names were similar. The Greeks learned the sign when the Phoenicians taught them writing But since they d d not use the peculiar ch sound of eheth in their speech d fierent groups of Greeks used the letter for various related sounds

The eastern or long Greeks used at for the vowel sound in cheth lengthened into ay as in hay Thus they got their letter eta (4) Certain Western Greeks including the Chalcidians who settled in Italy preferred to u e this sign for the h sound in ha The Romans adopted the sign with this western meaning in their Latin alphabet From Latin the capital H came without change into English

Meanwhile a small handwritten Greek eta (5) had taken shape with curves from the Semitic cheth. By the 9th century, the corresponding Latin letter which indicated the sound of h had acquired a shape (6) much like our handwritten and printed small b Note -For the story of how alphabetic writing began and developed see the

articles Alphabet Writing 

to be b

Hang den Netherlands See in Index Hague The Haskon (86 km) IV (1204-63) ihn Old kng of Norway added Greenland and Iceland to Nor-Raba Alois (boyn 1893) Czech com poser experimented with quarter sixth and twelfth tone music in fluenced by shelent Slav and Greek music Habakkuk thể but sk or hib a tik)

a Hebrew minor prophet Probably of 7th century a C Book of Habak Haskon VII (born t872) king of Norway accepted Norwegian crown 1995 on separaj on of Nor kuk 8th of the minor prophets deats with the wickedness of the nation the raw of the Chaldeans and the appearance of God in judg

way from Sweden N 3042-5
Haariem (har lem) Netherlands cap-ital of North Holland Pop 155 855 H 259 maps B 111 E 424 picture Habana Cuba See in Index Havana Habens corpus | id be dy Lo p a) &

brought before a court Merryman case T to aber (ha ber) Frits (1865 1934)
German chemisi professor Ber in
University specialized in electro
chemical investigations with Carl Haber (ha ber)

Boach invented synthetic process of making ammonia Nobel prize in chemistry 1919 N 241 aber Bosth process of nilrogen Haber Bosth fixation N 841

Exaction N \$41

Hablehisburg (ha bists burn) the
Hunks Casile zeal of Hapsburgs
H 281-2 pict re H 261

Rable H 240 involuntary action W 134

writ requiring a person in custody

H 239 Hals a paintings H 251

Invades Scotland T 120

wegian realm

learning and L-143 study habits S-433-4

Hnbitant (0-be-tan'). French-Cana-dian farmer C-85, D-156, Q-4. dian See also in Index French-Canadians

Habit-forming drugs N-13 Habsburg, ruling family. See in In-

dex Hapshurg

Habutai, or habutaye (hā-bū-tī') (Japanese for "soft as down"), a silk similar to China silk, but heavier.

Latin Hacienda (ha-si-in'da), in America name of huge landed estate for farming or stock raising, name also applied tu mining or manufacturing place · S-264 Chile C-253

Mexico M-200

Hackamore, a bitless bridle for horses

Hackberry, a tree (Celtis occidentalis) of the elm family, ranging over most of the U.S., resembling the elm in aspect, with ovate leaves and rough bark, and bearing small, round, purple-skimied fruit with sweet yellowish flesh; also called sugarberry and nettle trec.

Hackbut, early handgun. See in In-

der Arquebus
Hack'ensack, N. J., city 12 ml n of
Jersey City on Hackensack, River,
100p. 29,219, airplane accessories,
paper board, chemicals: map. mset N-164

Hackensack River, In & New York and

Hackensack River, In S. New York and n New Jercey, empties into Newark Bay; about 50 mi long; navigable for 16 ml map N-164 Hackett, Charles (1887-1942), oper-atic tenor born Worcester, Mass; debut in 'Mignon', Genoa, Italy, 1915; later with Metropolitan (New York City) and Chlcago Clvic Opera companies

in 'Romeo and Jullet', picture O-391
Hackett, Francis (born 1883), American literary critic, blographer, and novellst. born Kilkeuny, Ireland ('Henry the Eighth', blography; 'Queen Anne Boleyn', historical

novel).

Hackett, James Keteltas (1869-1926), American actor and manager ('The Prisoner of Zenda'; 'The Pride of Jennico'): son of James H. Hackett (1800-1871), who was one of the most noted comedians of hls day.

Hackmatack. See in Index Tamaraek Hackney, horse of English hreed H-428a, picture H-428c, table

H-428e

adassah (ha-dās'a), the Women's Zionlst Organization of America; founded 1912 by Henrietta Szold Hadassah (1860-1945); devoted especially to health work in Palestine (now Israel); the name is a Hehrew form of Esther.

Hadduck, a codlike fish H-240, F-114 Haddunfield, N. J., borough, residential suburh, abont 5 mi. s.e. of Camden; pop. 10,495: map N-165

Haddun Hall, famous old manslon in Derbyshire, England, 30 mi. s.e. uf Manchester; associated with Dorothy Vernon: picture A-317

Ha'den, Sir Francis Seymuur (1818-1910), English etcher and surgeon; in addition to distinguished career as surgeon, became foremost English etcher, cansing revival of etching in England; hrother-in-law of

Hadenduwa (hō-dēn'dū-tra), Hamltic people of Nuhia. Africa, S-442, color

nicture A-38

Hader, Elmer Stanley (horn 1889), artist and writer, horn Pajaro, Calif.; painted landscapes and por-traits; collaborated with his wife, Berta Hoerner Hader (born San Pedro, Coahuila, Mexico), in writing and illustrating children's books

ing and illustrating children's books ('Spunky'; Whiffy McMann'; 'The Big Snow', awarded Caldecott medal 1949; 'Lost in the Zoo'). Indes (hā'dēz), in Greek mythology, god of lower world, also name of lower world H-241, P-324, R-132, picture H-241

Aesculaplus and H-300

Demeter and Persenhone D-62-3. M-476a-b

Hercules visits H-342

Orpheus and Eurydice O-426 Haddeld, Sir Robert Abbott (1858-1940) English metallurgist, born Sheffield discovered manganese and silicon steel in 18-3 ('Metallurgy and Its Influence on Modern Progress' 'Faraday and His Metal-lurgical Researches').

Hndhrnmant (hā-drā-mont'. ndhrnmaut (hā-drā-mout', Arable hā-drā-mā-ot') a region of s Arabia in Aden Protectorate houndaries undefined: A-284, maps A-407,

A-285 HndJi, HnJji, or Hodft, title gained by pilgrim to Mecca M-159

Hadley, Arthur Twining (1856-1930), educator and political economist born New Haven, Conn ; associated with Yale University throughout most of his life as student, teacher and as president 1899-1921, authority on rallroad administration ('Railway Transportation Its History and Its Laws'; 'The Education of the American Citizen'; 'The Liberty Conflict between Equality').

Hadley, Henry K. (1871-1937), com-poser, born Somerville, Mass, con-ducted orchestras of Seattle and San Francisco, also Manhattan Or-chestra in New York; associate con-ductor New York Philharmonic Orchestra: composed operas ('Cleo-patra's Night'), symphonies ('The Four Seasons'), cantatas, songs.

Hadley, Juhn (1682-1744). English mathematician and physicist; in-vented sextant 1731; improved re-flecting telescope: T-47

Hadrian, or Adrian, popes. Sec in Index Pope, table Hadrian, Publius Aelins (76-128), Roman emperor, horn in Spain R-188, L-131 hullds walt in Britain E-358, R-188,

S-64, picture S-65 bust, picture R-183

empire, map R-182

Pantheon crected by, picture A-306 rehulds Jerusalem J-338 tomb, Castel Sant' Angelo. Rome

R-197, map R-190, picture R-189 Hadrian's Wall, Roman fortification across n. England between the Tyne

River and Solway Firth E-358, R-188, S-64, picture S-65 neckel (hřk'). Ernst Heinrich (1834–1919), German biulogist; ad-Hneckel vocated Darwinian views; aroused cuntroversy by antitheological at-

titude ('Natural History of Creatiun': 'The Riddle of the Universe').

Hafiz (hā'fiz), pen name of Shams-ed-Din Mohammed (dled 1388?), Persian lyric poet and philosopher; tomh near Shiraz a place of pligrimage.

Hafnium, chemical element, fubles P-151, C-214 Hafun, Ras (rüs hā-fim'), cape ("ras") of Somallland: easternafun, Ras (rüs hā-fiin'), cape (''ras'') of Somallland; eastern-most point of continent of Africa; s.e. of Cape Guardafui: mup A-46

Haganalı (hã-gã-nã'), Jewish defense organization in Palestine (now Israel) P-47, I-256, picture I-257 Ha'gar, Sarah's handmaid, mother of

Abraham's Son Isbmael (Gen. zvi. zzi). Hag'edurn, Hermann, (born 1882). author, born New York City; wrote poems, pageants, and plays; biographer of Theodore Roosevelt ('Boys' Life of Theodore Roosevelt'; 'Roosevelt in the Bad Lands'; 'The Rough Riders'); also biographies of Leonard Wood, Edwin Arlington Robinson, and others.

Arlington Robinson, and others.

Hageman (hö'gē-mön), Richard
(bern 1882), American composer
and conductor, born Netherlands; a
conductor of Metropolitan (New
York City), Chicago, and Los
Angeles opera companies; composed
many songs ('Do Not Go, My Love')
and opera ('Caponsacchi').

Hingen (hā'gō'a) Wniter (born 1892),
golfer, born Rochester, N.Y; won
I'S Ogen 1914 and 1919 Profes-

I'S Open 1914 and 1919, Professional Golfers Association tournament 5 times (1921, 1924-27), and British Open 4 times (1922, 1924, 1928, 1929); retired from competition 1940

Golf's Hall of Fame G-138

Hagen (hā'āen), Germany, industrial clty on Volme River about 31 mi. ne of Disseldorf pop 146,401; lmportant iron-and-steel works: metal goods

Hugen, in 'Mbelingenhed', slayer of Siegfried 8-177, N-232 Hingenbeck (ha'gen-bek), Carl (1844-1913), German animal dealer and

showman E-327 Hagerstown (hā'gi'rz-town), Md. city in center of rich farm section, mi nw of Baltimore; pop 26,260; rallroad shops alreraft, textiles, sand-blast and dust-collecting equipment, shoes, pipe organs, refrigeration equipment, furniture; Hagerstown Junior College: battlefields of Antletam and Gettysburg nearby mop M-116 John Brown at B-331

Ilugersing n Vulley, or Cumberland

Vulley M-109
Ilaguel, or burer, an eellike parasitic fish P-80

evolutionary position F-108 Haggat (hagga-1), 37th book of the Old Testament, also the name of a Hebrew prophet who flourished about 520 B.c.; Haggai appealed to his countrymen to restore the Temple.

Hag'gard, Sir Henry Rider (1856-1925), English nuvelist and writer on land economics; spent early life in S. Africa, scene of many of his best novels, including 'She', 'King Solomon's Mines', 'Allan Quater-main', 'Ayesha, or the Return of She' ('Days of My Life', autobiography).

Haggard hawk, or blue hawk, a falcon F-15

Hagiugrapha (hāg-l-ōg'ra-fa or hā-gi-ōg'ra-fa), or "Holy Writings." yi-ôg'ra-fa), or "Holy Writings," portion of the Old Testament P-419 Hague (hağ), The (Dutch, '4 Graveu-

tiage, also den Hnag), governmental center of the Netherlands; pop. 532,93°; H-241-2, maps B-111, E-416, 424, picture H-242
International Court of Justice

U-240a, H-242 Royal Pieture Gallery. See in Index

Museums, tuble

World Court L-142 Hague Cuurt. See in Index Permanent Court of Arbitration

Hague Peace Cunferences H-242 armament limitation fails P-102 Peace Day F-56

Peace Palace, gift of Carnegie C-124, picture H-242 poison gas banned C-208 United States represented by Ben-

jamin Harrison H-277 Ha-Ha, a game G-8e

Hahn (han), Ottu (horn 1879), German physical chemist, authority on radioeclisity and alom discoverer with Lise Meltner of protoactinions (1918) with Fritz Strassmann achieved Uranium fixed 1919 vranlum fission awarded Nobel prize in chemistry 1944

elomic power project table A 484
Habuemann (hi nr ian Samue
C 1 (17 5-1913) German physi Samuel cian inunder of hon copathy Halds (h: la) Indian tribe that fives in Brillsh Columbia their houses and canoes were nolewor I 106c +10p I 106f table 1 107 il 16k1 A 133 noleworthy

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tolem pole picture F 18b

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olg British naderick i bigmere Hete (h rn. 1828). Can idn'in writer neturelisi and maxistrate Loin Nussex England in ed to Brilish Columbia 1027 books (r chili trea Starbuck Valley Whiter (k na dian Book of the Year for Ch idrea award 1940 Sallwaley Summer and Mountel Pol ce Pairol for adulis The Western Annel r

adulie The Western Ander Holgi I (n Iff (18.5 1 01) Canadan eulhor born Adolphuslown Upper Canala (Country Life in Canada Here and There in the Home Lend)

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Hall (Adi) in melcorology H 242 Hall Culimble pairiolic song of US v a0
folio velussie I (hilo e/ las ) (Rae
India: Melonneo) (born 1892)
en peror of Ethiopia educalel al e
French mesion he bectme widely
read and familiar with Europeen Rolle read and familiar with Europeen politice and history made regent October 1928 sharing throne with his aunt Empraes Zaud in until her when he became cole death (1930)

ruler made afficial v at to U S in 1954 F 403 picture E 403 Hainan (Al nas | sland 15 ml from Coast of China in South Chine Sea sland 15 ml from 13 500 s | n : pop 2 500 000 jungle civered mointaine rich val

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Hainisch (h: nizh) Michael (1856-1349) presideni of Ausirian Re public 1920 28 noted Social si writer previously (1909) member of Ausir an paritament

of Ausir an parliament lawored Germany a famexation of Austria Bialphong (hi fong) commercial cen ler and port of Tonkit Vile Nam 1ndo China in Songkol (Red) River delta about 60 ml et of Hanol pop 143 000 one of chief ahlpping points for coffee 1så alik

in that portion of Viet Nan awarded to Vietnanb forces in 1854 1 124 maps 1 123 A 407 of Viet Nam Hair animai H 242-3 picture H 243 characterist c of mammals hi 22 economic uses H 243 felt F 50 horn related to H 428

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port on a rocky promontory in a Hokkaido por 228 994 maps 3 297 A 406 linkyon (Julas on) or Meyone in Greel mythology h 45 Haleyes and ent name for kingfi-her a fish esting bird h 45 B 177 color

p of 1a B 183 Malcyon days h. 48 Baldate Joln Scott (1860-1836) Er tish sc entist born Edmburgh d rector Binling Research Labora a rector Mining Research Labora lory Birmingham University Gif-lord lecturer Glasgow Eniversity in charge of government inquiries vanillation respiration

on ventilation respiration aud cause of mine evplosions (The New Physiotopy The Sciences and Philosophy) Jather of J E 3 Haldane (horn 1832) professoe of genetics at London University (Possible Worlds) and of Assoal Methleon (horn 1837) noveltsi M tchleen (born (Anna Comment)

(Anna Commens J Matdene of Clean Richard Burdan Haddene first Viscouni (18-6-1228) British draie man and philosopher born in Scotland wrote Life of Adam Smith The Pathway to

Reality' The Reign of Pelalivily and The Philosophy of Humanism philosophy lifled to nd sludent of German
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wat in House of Commons
it as secretary for war 1883-1911 1883-1911 as secretary for war I rid el anceli r 1312-15 and 1924
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istrator born Scitzerland fought during French and Indian wars governor of Canada 1778 54 5tern Iv hed down French syn painizers with American Revolution sie Adam de la See in Indez Adam de la Halle

de la Halle
Hate Edward Everett (1822-1902)
Unillarian minisism born Bowton
author of The Man Without a
Country H 247
Hate Ceorge Elers (1808-1938) ac
tronomer born Chicago sircal
recearch in solar and siellar

tronomer born Chicago a real research in solar and slellar enectroscopy invented a ectrohel o eraph organizer of Yerkes Cheer, atory (director 1892 1905) ent of Blount Wilson Observatory (d rector 1904-28) eunapoi lheory 8 453

State Jain Farker (1806-73) organism and wistemman born Porhesier ale Jain Kerker (1866-73) Grains and sisteman born Pochesier N H lone member of House of Pepresenielles and fur it years ni Sensie Snielavery edvo ale nominaled for pre-dent by Free Sail Democrais niss consumnty ann orted Lincoin throughout Civil

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Bule Lucrelli Pesbody (1890-1900)
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Maleb Syria Sea at I far Alepia
Mitte Stepten (1077-165) English un siologist and inventor bor: Bel e-bourns I nown for his Stall cal Desays which desays which describes exteri menia in plant physiology and in

ments in plent physiciacy and in blood pressure and circuittion Hatery (6 id ws.) Jacques François Froments Life (1799-1862) Franch composer born Paris France won Prix de Rome 1819 trafesor Paris conservatory etter 1821 laughl his tulurs son in law Georges Biret also Charles F Gound Anown for Julve opera member Legion

of Honor La Julye slory O 390

La Julve slory () 390

Rateyr Ladorte (1854-1908) French
dramalisi and novellal for over 20
years collaborated with H Melinac
oa operettaa, Larces and comed as
chiefly about Parisian life ( Le
Belle Hielène La Granda Duchesse

'Barbe Bleu'); aiso wrote 'L'Ahbé Constantin', sentimental, popular tale, classic for French instruction. "Half-breeds," Republicans who opsentimental, popular posed nomination of Grant for 3d term (1880) G-21

Half life (of element) R-54c-d, chart R-54b

Half-moon, a lunar phase M-384, 386, diagram M-385 Half Moon', Hudson's ship H-437 Half nelson, in wrestling, pictures ₩-305-6

Half-timbered. Sec in Index Architecture, table of terms Half title, of a book B-239

Halftone engraving P-210b-c

Half-vacial writing B-235

Hal'iburton, Thomas Chandler (1796-1865), Canadian humorist; pen name "Sam Slick"; iawyer and name "Sam Slick": lawyer and judge in Nova Scotia; retired to England (1856) · C-105 Sam Slick, picture C-106a

Halibat, a fish H-248, F-140, F-114,

picture H-248

Halicarausans (hāl-i-kār-nās'ūs), an-cient Greek city in Caria, Asia Minor, map G-197

birthplace of Herodotus H-349 Mausoleum S-105, picture S-106

Halidah Adih, or Halide Edib, Sec in Index Edib, Halide

Hal'idoa Hill, height n.w. of Berwick-upon-Tweed. Engiand, where Eng-lish under Edward III defeated the Scots (1333).

Hal'liax, Charles Montague, earl af (1661-1715), English statesman; Introduced into Great Britain na-tional debt instead of annual taxation to meet expenses of war; car-rled out recoinage (1695); patron of Newton.

Hallfax, Edward Frederick Lindley Waod, earl of (born 1881), Brit-lsh statesman, born Yorkshire; entered Parliament 1910 as Conservative, 1924-25 minister of agricuiture; 1926-32 viceroy of India; 1935 secretary of war; 1935-38 leader of House of Lords; 1938-40 foreign secretary; 1940-46 ambas-sador to United States.

Halifax, England, manufacturing city in n., 12 mi. s.w. of Leeds; 98,376; textlics, Iron prod products. chemicals, coal mining; map B-325

Halifax, important port and capital of Nova Scotia, Canada; pop. 85,589: H-248-9, mops C-69, 73, picture N-309

Hal'ite, sodium chloride ln mineral form M-265

Hall, Asaph (1829-1907), astronomer, born Goshen, Conn.; professor at Harvard University; discovered two moons of planet Mars.

Charles Francis (1821-71)explorer, born Rochester, N. H.; searched for Franklin party from 1860 to 1869; died on expedition to North Pole in 1871. Hall, Charles Martin

all, Charles Martin (1863-1914), American Inventor H-249, A-183-4, picture H-249

aluminum production patented, table

I-199 Hall, Chester Moor (1703-71), English lawyer, mathematician, and inventor, born Leigh, Essex L-169

achromatic telescope T-47

Hall, Esther Greenacre (born 1904), author of books for girls, born Greeley, Colo.; journalist and author of books to, greeley, Colo.; journalist and teacher; her experiences are background for her books ('Up Creek Down Creek'; 'College on and Down Creek'; 'College Horseback'; 'Haverhill Herald')

Hall, G(ranville) Stanley (1844-1924), psychologist, educator, and editor, born near Ashfield, Mass.; presi-

dent and professor of psychology Clark University, Worcester, Mass., 1888-1920 ('Adolescence').

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Norman (1887-1951) Hall. Junies writer, born Colfax, Iowa; lived many years in Tahitl; author of 'Doctor Dogbody's Leg', tales, and 'My Island Home', autoblography; with C. B. Nordhoff wrote 'Muliny on the Bounty', 'Men Against the Sea', 'Pitcairn's Island', 'The Hur-ricane', and 'The Dark River'.

Hall, John Harris, inventor of breech-loading rifle F-79

all. Lyman (1724-90), signer of Declaration of Independence; govcrnor of Georgia (1783-85) signature reproduced D-37

Ind'iam, Heary (1777-1859), English historian ('Europe During the Middle Ages'; 'Constitutional History of England'); father of Arthur Heary Hallam (1811-33), subject of Tennyson's 'In Memoriam'.

conductor, born Hagen, West-phalia; exerted important influence on musical education in England; married Mme. Norman Ne-

ruda, noted violinist

Halle (häl'ū). Germany, city on the
Saale River 20 ml. n.w. of Leipzig;
pop. 222.505; large saitworks;
machinery, chemicals; noted for
university founded in 1694 by Frederick III, elector of Brandenburg: maps G-88, E-416, 424 Halleck, Iltz-Greene (1790-1867),

poet, born Gullford, Conn.; remembered for 'Marco Bozzaris', and 'On nercd for Marco Bozzaris, and On the Death of Joseph Rodman Drake'. Halleck, Heary Wager (1815-72), Civli War general, born Western-ville, N. Y.; succeeded McClellan in July 1862 as general in chief of all

July 1862 as general in chief of all Union armiles; superseded March 1864 by Grant: C-334 Halletulah (håd-c-ly'ya), a Hebrew word meaning "praise ye the Lord." Haller (häl'cr), Albrecht von (1708–77), Swiss anatomist, physician, physiciogist, botanist, and poet, hys. physiologist, botanist, and poet, born Bern; particularly noted for doctrine of Irritability of nuscles (Elementa Physiologiae Corporis Humani').

Halley, Edmand (1656-1742), English astronomer; predicted return of "Halley's comet": C-420 Newton and N-194 Halley's comet C-420, picture C-420

Hallibarton, Richard (1900-1939), writer, lecturer, and traveler, born Brownsville, Tenn.; wrote in youthful, vigorous style; lost in attempt to sail a Chinese junk across Pacific Ocean ('Royal Road to Romance'; 

dilidie (hä'i-di), Andrew Smith (1836-1900), Scottish-American civil engineer and inventor, born London, England: S-430 Hallidle

Hallmark, official stamp used by gold-smiths and silversmiths to indicate purity; originally used on gold and silver articles in Goldsmiths' Hall in London; used figuratively of pereons or things showing signs of genulneness.

Hall of Calamns, at Karnak, color picture A-307

Hall of Fame, for baseball men B-70. See also in Index Baseball Hall of Fame and Museum, National

Hall of Fame, for football coaches and players F-232 Hall of Fame for Great Americans H-249-50, picture N-224 Hall of the Abencerrages (ā-bān-thā-

rā'hōs), Alhambra A-167

Hall of the Ambassadors, Alhambra A-167

Halloween (hāl-ō-ēn'), the evening of October 31 H-250, pictures H-250

Hallstatt (häl'shtät), Austria, village on Lake Hallstatt; old and famous salt mines; ancient Celtic remains of Iron and Bronze Ages, dating back 3000 years or more.

Hallström (häl'strüm), Per August Leonard (born 1866), Swedish nov-elist, horn Stockholm, Sweden; chairman of committee of Swedish Academy for Nobel awards ('Stray Birds'; 'An Old Tale').

Halluclua'tion, imaginary perception where no actual object exists, as in dciirium.

(häľväks), Wilhelm Hallwachs (1859-1922), German physicist, lecturer at Leipzig and Strassburg, professor of physics at Dresden technical Institute and at Glessen; in 1888 discovered underlying principle, known as the Hallwachs effect, of the photoelectric cell. Halmahera (hāl-mā-hā'rā), island in

Moluccas, Indonesia, w. of New Guinea; over 6,500 sq. ml.; pop. 83,882; mountainous, tilick forests; sago paim, rice; bombed by Americans Sept. 1944 during assault on Morotal nearby: maps E-203, P-16

Halo (ha'lo), in astronomy, luminous hands around the sun or moon caused by refraction and reflection of rays of light by the ice crystals in the atmosphere; in art, circle of light surrounding a head to de-

note divinity or saintliness.

Halogens (hāi'ō-ġēnz), the four related chemical clements fluorine. chiorine, bromine, and iodine C-288 derivation of word C-213

Halogetaa, a poisonous weed of the Chenopodioccoc family; several species in Mediterranean and cen-tral Asia regions; first found in U.S. in n.e. Nevada 1935; now in parts of Idaho, Utah, Oregon, Nevada; polsons sheep and other animals, causing death; W-84, P-339

Hal'ophytes, plants which live in saltwater environment.

Halper, Albert (born 1904), writer, born Chicago; hegan writing in 1928; wrote his first novel Union Square' (1933) while living in poverty ('The Foundry'; 'The Chute'). Its (hāls), Frans (1580?-1666), Dutch painter H-250-1, P-29 (The Gypsy Girl' P-29, color picture P-20

P-29

Halsey, William Frederick, 1882), U. S. Navy off 1882). U. S. Navy officer, born Ellzabeth, N.J.; led successful attacks on Gilbert, Marshall, Wake, and Marcus Islands Feb. 1942; made head of naval forces in s. Pacific Oct. 1942, in command of Sofomons campaign; commander of 3d Pacific fleet 1944-45; appointed fleet admiral (5-star) 1945; retired 1947.

Hälsingborg, also Helsingborg (hel'sing-bor), seaport of Sweden; pop-71,718; in s. opposite Helsingör. Denmark; had important part in Scandlnavlan wars: maps N-301,

E-424 Halter hitch, or halter the K-61, plotures K-61-2

Halatzim, Jewish pioneers in Palestine P-46

Halyard. See in Index Nautical terms. table

Halys River, in Asia Minor. See in Index Kizillrmak

Ham, son of Noah; traditional cestor of Hamites (Gen. vi, ix). traditional an-

Ham, East and West. See in Index East Ham; West Ham

Ham pork product amoking and curing H 404 M 154 piclure F 223

HAM ---

ema (ha mā) Biblical Hamaib Syris cily on Oronies River 115 mi ne oi Damaseus remains oi Hema ancient Hittles now important irading center pop about 10 000 maps A 285 P 158
Remaden (hi mā dā; ) ancieni Fe

balana manufacluring cily capital oi Hamadan province in w Iran pop 104 000 ieli and lealhes mapa A 408 I 224

Hamadeyad (hām a dyldd) or detad wood nymph in Greek mythology N 119 Hamadrynd or king cobes C 573

Hamadeyad bal oon B 2

amaguchi (ha m fg cfi) Take (1870 1991) Japunese stalesman became premier 19 9 called War nor for Peace I r support of Less Hamaguchi Navni Trealy 1910 averes no led

Hamamell I seene Sex in Index Wilch hazel family Haman (k 31gn) thief m nister of

Haman (h 1931) chief m nister of Persion king Abaquert a outwilled by Deiber D 399 Hamain Sprin See to 1 the Hama Hamain Sprin See to 1 the Hama Hamain Sprin See to 1 the Hama Hamain Sprin See to 1 the Hamain See Commission See to 1 the 1 the

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Ramblin duceb (1812 88) More missionary to Indians born Selem Ohio converted to Mormoni'm 1843 and nade elder to Utin 1850 sent as missinnery to coulbern Hah 1854 promoted near between

1854 promoted peace between

whites and indight Hamburg as slide and city of Fer many on Fibe F ver pop of cy 1805 808 H 231 2 1078 C 28 II 418 424 picture H 251 harbor improvements H 261 h ember of Hansette I eague H 261 Flergatien (200 Z 25)2 water front pact re H 255 Flergatien (200 Z 25)2 water front pact

Hameln (hameln) also Hamelin town in n w Germans 25 ml ew-of Hanover pop 48 086 famed as-ween of legend of the Fied Piper Ham erion Philip Cillert (1824-44)
English writer pa nier and art
critic (The Intellectual Life)

Hamilton (An mil Lar) Baren (2707-228 BC) Carlhag n an general failher of Hann bal and Handrubal

Larcelona founded by B 54 itamilion Alexander (1712-56) Scot lish phys can and diarisi bord Edinburgh Scotland practiced medicine Annapolis vid after

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Gibbs (The Blindness of Virtue Biantition Frame Lady (17957-1915) William Hamillou

(1730 1803) British envoy al ples active in social and political life of Naples an intimate of Queen

iffe of Naples am initimate of Queen Maria Carol na friend of Admiral Horatto Neison model for many fancous paintings by Formery Hamilton Henry (died 1799) British soddier governor of Detroit during Revolutionary War incited Indian raids along frontier laier gover raids along frontier laier gover to the painting of the Proposition of the State of the Proposition of the Proposition of the surrender of the Proposition of the Proposition of the surrender of the Proposition of the Propos

surrender at Vincennes C 339 Hamilion Sir Ian (1953 1947) Bril-jub general jo ned the army n 1873 and served until 1919 disting Ished himself in South Africa and Ind a con manded Dardine less expedition

in World War 1 (1 allipoli D ary Soul and Body of an Army Jean a blog raphy of his wile) amilton Sir William (1788 1956)

Scullish philosopher as professor of log c and metaphysics at Edin allmulated his sindents to

heliei in imperiance of psychology Routten Sir Will am Rewan (1805-65) Brillah methe nelician born developed q talernions ireland a form of calculus

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Kronborg Castle p cture D 68
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Me vice president 1991 63 intimale friend and advaser of Lincoln
male friend and advaser of Lincoln See gito in I der Staluary Hall (Maine) ichic

(Maine) 10000

Handles Inhersity at Si Paul

Minn Methal at founded 13.4 at
Red Wing Minn
10 Hamiline (now Midwar Dejrice
10 Hamiline (now Midwar Dejrice
11 limeapolis and Si Paul) aris

and actraces nursing ai praction of Ahre and Lines n w at Junction of Anne and Lippe rivers in Rubr Valley pop 89 804 railroad and trucking center coal

rentore and free mg center coal sicel mach nery thermal baths town founded 1 % joined Hanses. Its League 1417 map E 424 ammed4 (hdm e dg) in descri-Hammada D 73a

Hammarskilled (hdm dr sh il l) (Hjaimer Agne Carl) (born 1905) Swedish diplomal and financial ex peri born Jönköping Sweden son of Hislmar Hammarskiöld under of Halmar Hammarskjöld under seerrlary Swedens drpariment of finance 1325-45 chairman of board Bank of Sweden 1941-48 depuly foreign minister 1951 53 riccted accrelary general of tha United Nations 1955 for five year lyrm

Hammaeskjold Hjalmae (1862-1953) Swedish statesman falher of Dag Hammarskjöld prime ministee I onal arbitration courts

Hammer a tool T 148 150 plotograph ball peen B 204a claw ps ture M 180g pneumalic P 328-9 T 150 diageon s

P 200 Hammer and airkle emblems in Pus alan flag F 1360, color picture F 133

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Banmerfest (homor-fest) Norway
port on Kvaló Island on Arctic
Ocean pop 3539 northernmest
town in Europe lee frea harbor
N 3060 map E 417 Hammerhead shack S 135

Hammerlock wrestling hold picture Hammersmith Englat d western bor iammersmith Englard western bor ough of London pap 19 317 beel bu iding and other nanufactures home of William Morria ammerslein (Idm er stm) Osear (I'47 1919) American opera ont thealer director born Germany

thealer director born Germany menager Manhaltan Opera House b Y foremost in establishing foremost in NY foremost in establishing french opers in America immersish Oscar II (born 1895) twic writer and bredlish one New York City adapted Show Fort wrote book and july for Rose Maria Dewert bong Okte-

Ross Maria Desert Song Ohite-borna Carmen Jones Larousel Allegro bouilt his fit (ior hese ised her Richard Rodgare whole he music) was coproducer with Pod pers of I Remen er Vilma and Annie Get Your Qun The King and I picture A 400/ annee 1 coults a crori T 183 pto Hanimer 1 co

world record table T 181 ammell (Samuel) Dashleli (born 1894) aulhor born al blarys Coun ty Md founder of hard boiled 1994) sulhor born al Marya Count ty Md founder of hard boiled school of delective fiction (The Mailess Falc n The Chara Lee The Thin Man Tha Allentures of Sam blede; some storics trans lized in motion pictures and an radio

Ham mand John Plays (1855-1938) guining engineer boen San Fean in South Africa sentenced to death leased by Borrs upon payment of a \$125 000 the after 1904 ecily in U S and Mexican mining de

velopmen) and in hydroelectric and irrigation projects Hammand Jaho Hays Ir (born 1888) Inventor son of the above born San Francisco inventor o radio controlled locproces conitoling ships

system of selective rad o telegraphy Laurena (porn 1890) In Hammond ventor of Hammond electric organ venior of Hammond electric organ
boen Evanston III also invented
novachord and ele tric card
shuffling bridge table peccident of
Hamm nd insteument Co O 424
lammeed Ind manufacturing and
rallroad elty on Lake Michigan ad-

Sahara S 15

joining Chicago; pop. 87,594; steel products, railroad cars and supplies. products, chemicals

petroleum products: I-84, map I-78 Hammurabi (ha-mu-rà'bē) (ahout 1800 BC), king of Babylonia or-ganizer of empire and eodifier of laws: B-7-8

prohibition laws P-416

Hamp'den, John (1594-1643), English Puritan, patriot, and statesman H-254

Hampden, Walter (Walter Hampden ampden, Walter (Walter Hanpden Dougherty) (1879-1955), actor, born Brooklyn N. Y; debut in England 1901 with classical repertoire company; notable in 'Hamlet', and other Shakespearean plays, 'The Servant in the Honse', 'Cyrano de Bergerae', and 'The Patriot'

Hampden-Sydney Cullege, at Hamp-den-Sydney, Va; Presbyterian for men; founded as Prince Edward Academy in 1776; arts and sciences

Hampshire, county of a England, area 1650 sq. mi., pop 1 292,211 includes administrative counties of Southampton (area 1503 sq mi; pop. 1,196 617) and 1sie of Wight called Hampshire includes ports Southampton and Portsmouth map E-347

chalk deposits, picture M-265

Hampshire, breed of hog H-404 Hampshire, breed of sheep S-138 Hampstead, England metropolitan borough in n w of London pop 95,073; formerly noted for mineral springs; residence of first Earl of Chathan, John Constable George Romney, Sir Richard Steele, John Keats, Leigh Hunt

Hampstead Heath, open space of 240 acres in north of London preserved

to great extent in natural state Hampton, Wade (1818-1902), statesampion. Made (1916–1902), State-man and Confederate general born Charleston S.C.: raised and equipped "Hampton's legion": U.S. senator 1878-91; U.S. commissioner of Pacific railroads 1802-97 See also in Index Statuary Hall (South Carolina), table

elected governor of South Carolina R-86, picture R-85b Hampton,

amplon, Va. port city in sc, situated on Hampton Roads and bordered by citics of Warwick and Newport News, pop 60 994; fisheries and sen-food processing; metal products. products, building Hampton Institute; Force Base and US building materials: Langley Air Fort Monroe. Settled 1610, it is oldest continuous Settled 1610, it is oldest continuous English community in American Site of first free school in American Colonies. Provided haven for exiled Acadians 1755. Town attacked by British in War of 1812; burned by Confederates in Civil War to prevent occupation by Federals. Chartered as eity 1908. Enlarged in 1952 by consolidation with county of Elizaheth City and town of Elizaheth City and town Phoebus: N-242b, map V-487

Honotous: N-2420, map V-487
Hampton Coort, England, palace on
Thames River 10 mi. s.w. of London, pictures E-366, W-304
Hampton Institute, at Hampton, Va.:

founded 1868; for Negroes; agricul-ture, business, education, home eco-nomies, nursing: N-108

nomies, nursing: N-108
Booker T. Washington at W-15
Hampton Roads, channel in which
James, Nansemond, and Elizabeth
rivers converge and flow into Chesa-

rivers converge and now into Chesapeake Bay, Va. C-224
Civil War, map C-335; battle of
Monitor and Merrimac M-346-7,
picture C-337; peace conference

naval operating base N-242b

Hampton Roads, Port of N-242b Humster, small rodent H-251, picture II-254

altitude range, picture Z-362 orlgin of name P-182b pets care of P-182b

Hom'sun, Kuut (1859-1952) Wegian novellst as young as young man wegan novelet as young man worked at odd jobs was streetear conductor in US later settled at Grimstad Norway Limous after less when novel 'Hunger' ap-peared also wrote Growth of the 1888 WHEN NOVEL TRUNGER Ap-peared also wrote Growth of the Soil' (Nobel prize 1920) 'Women at the Pumn' 'Pan 'Vagabonds', and 'Look Back on Happiness'

Hamtramck Cham-tram'd) Much manufacturing (ity surrounded by Detroit pop 43/355 (\*559 in 1910) wheels from and aliminum castings automobile accessories map

Han, 'the river" in Korea rises 30 mi from e coast outs Korea nearly in half, and flows through Seoul and thence into Yellow Sea 292 ml long, nay lgable for about 75 ml for motor and sailing hoats map 18-65

Hanan (ha'non) Germany city on Main River 10 n t c of Prinkfurt, pop 30 625, machinery, Napoleon defeated Bavarians in 1-15 E-425

Hanby, Benjamin Russel (1813-67), song writer born Rushville Ohio, song writer born Rushville Ohio, pastor United Brethren Church 1861-b) ('Dirling Nelly Gray 'Little Tillie's Grave' 'Ole Shady 'Tyon the House-top' 'Who is ile in Vender Sentia' Yonder Stall?')

Han'cock, John (1737-93), American patriot, first governor of Massachu-setts H-254-5

burial place B-258

Gage attempts to arrest L-178 president of Continental Congress, picture R-120

Bignature Reproduced D-37
Hancock, Walker (Kirfland) (born 1901), sculptor, born St. Louis, Mo. won Prix de Rome 1925; Instructor in confirme Paper United Institutes in Confirme Paper United Institutes Institu structor in scuipture Pennsylvania Academy of Fine Arts, Philadelphia, Pa., after 1929

bust of Robert Frost, pictures S-74 Hancock, Winfield Scott (1821-86), Union general in Civil War H-255 Hancock, Mich., copper-shipping port opposite Houghton on Lake Portage, connected with Lake Superior by canal; pop. 5223; foundries, woodworking plants organizates woodworting plants, creamerles, snelters; Suomi College and Theological Seminary: map, inset

M-226

Hand, (Billings) Learned (born 1872),
jurist, born Albany, N.Y.: admitted
to bar 1897; judge U.S. district
court for s. N.Y. 1909-21; judge
U.S. 2d circuit court of appeals
1924-51; made recording for Library of Congress collection of
American folk songs; author of
'Spirit of Liberty; Papers and
Addresses'.

Hand, in anatomy H-255-6, picture

bones of S-192

man's and ape's, picture A-270 monkey M-348-9

palmar surface F-69, H-255, picture

right- and left-handedness C-240b whale filppers W-111-12 picture

Hand, unit of measurement equal to 4 in. (supposed width of palm), used to measure height of horses. Handball, a fast game of aneient Irish origin H-256-7, diagram H-257

Handbooks and manuals R-884-j selected list R-88j

Hund canum F-76, picture F-77 Han'del, George Prederick (1655-Han'del, George 1'rederick (1653-1759), German-English composer, master of the oratorlo H-257-8, picture H-257

music analyzed M-462 The Child Handel', picture P-249

Indeel and Haydu Society M-466 Handforth, Thomas (1897-1948), etcher, lithographer, and portrait painter, born Tacoma, Wash; studied art in Paris and the Far East: prepared children's picture books: 'Mci Li' (Caldecott medal 1939): 'Faraway Meadow'.

Handieraft, craft requiring skilled use of hand tools Reference-Outline I-147-8

lubliography II-397-8, I-148 Hund organ, or barrel organ, musical instrument with revolving barrel or cylinder; used by itincrant musi-clans, cylebrated in poem, The Barrel-Organ', by Alfred Noyes, Handshake, crigin E-404

Handwriting II-258. Sec also in Index Writing

Hundy, William Christopher (born 1873), Negro composer, born Florence, Ala.; wrote some of the first "blues" music which influenced the later "jazz" and "swing" (Memphis Blues'; 'St. Louis Blues', 'St. Louis Christopher (Breek, Breek, Blues') Blucs': Beate Street Bines'). (206 E.C.-A.D.

Han (han) Dynasis (206 E.C.-A.D. 220), China C-278-9 arts S-84; pottery C-277, P-394, S-84,

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Hanford Operations Office, Atomic liners, Commission W-38
Hangar (hōuơ'c'r), a structure that houses aircraft

polar regions, picture P-350b polar regions, picture P-350b

Hung'chair, China, 100 mi, sw. of

Shaughai; capital of Chekians
province; pop. 137,522; H-258, maps
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Hanging Gurdens of Babylon, one of
the Seven Wonders of the World
S-104, B-5, pictures B-9, S-106

Hungo (hang'a), Flanch seaport on Gulf

Chang'a Fingury seaport on Gulf

(hàng/l-ō), Finland, scaport on Gulf of Finland at entrance to Gulf of Bothnia; pop. 6791; called "Gibrai-tar of Finland" because of stratesic

tar of Pinland" because of summer position: maps E-417, R-266 Hunkaw, China, etty 600 ml. up the Yangtze River from Shanghal; pop 110 072, 11-258-9, maps C-259, 11-258-9, maps A-406

Hanks, Nancy (1784?-1818), mether of Abraham Lincoln L-246

Hun'nn, Marcus Alonro, known as Murk (1837-1904), merchant and political leader, born New Lisbon. Ohio; lived in Cicveland; friend adviser, and political backer of President McKinley; U. S. sena-tor 1897-1904

Mckinley and M-17, 19

Hannah, a plous Hebrew woman, wife Likanah and mother of the proplict Samuel.

Hanny, James Owen, See in Index Birmingham, George A. Hannegun, Robert E. (1903–1949).

Hannegun, Robert E. (1903-1949). lawyer and political leader, born St Louis, Mo.; Democratic National Committee chairman 1914-47; postmaster general in President Tru-man's Cabinet 1945-Dee. 1947 Han'nihai (2477-183 B.C.), Cartha-ginian general H-259-60 bust, picture R-183

meaning of name B-1

Mo., manufacturing city Hannibal. and trade center on c. state border on Mississippi River; pop. 20,444; scene of Mark Twain's boyhood and setting of his 'Huckleberry Finn' and 'Tom Sawyer': maps M-319, 11.252 U-253

Han no name of several Carthaginian oldlers and statesmen beat known is an admiral who explored n w coast of Africa about 500 RC and Hanno the Great (3d century ac) stalesman and general optopent of Hamilton and Hamping Hannover, Germany See in I dez

Hanover Hanover Hanover the Hanover Hanover a Tewa thicked among the litopt in Ar some in 1700 by migratus from the Ro Grande in New Mrxico other but impronerly called Treat

lianol (hā not ) one of largest clies of Indo China in n on Songh i (Red) River capital of Tonkin was often regar ted as cap tal of Viet Nam sithough Satgon was the administrative center pap 237 150 trade in silk and rice in that por tion of Viet Nam awarded Vietra sh

forces in 1954 I 124 maps I 123 A 407 university I 125

Hanotaux (a nd lå ) Gabriel \$1853 1944| French political leader and Prance standard work in its field edited 17 volume Hastors of the French Vation was at Assistant French Nation was at various times minister of foreign affairs and ardenity supported French Russian sill one in 1024 delegate to League of Nations to League of Nations are silved Hamover a former Prussian province in n w Cestillany

14 8J7 MT 14837 mg ml pop 3540 000 m corporatel into Lower Saron; (Siedersachsen) after World War

Treatment active twork was treatment of the treatment of II 280

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Hannel and Grelel German Hannel
und Grelel (Arn el nat fr. 4) Gre
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sel and Grelel tost in the woods
outwit an opress who turned th
dren into generabread soory releda
by Gelmm brothers, subject of opera by Humperdinci (1893) pic ter e S 404 Gerhard Henrik Hansen (han son)

Armauer (1841-1912) Norwegian physician discoverer of leprosy bacillus

Hanzen's diacuse another name for Leproxy See in Index Leproxy Hanska Cunnicas For de Baltac's wife B 42

Hanson Howard (born 1856) com poser born Weboo veb d rector l'astman S hoot of Muse Roch caler NY Lesides various chorat and orchesital pieces composed opera Merry Mount and two symptom ex Vordic and Romantic Hanton lehn ti71s 675 statesmen

anson lohn (1710 61) statemen burn (her ca County 'Ud repre sented Maryland in Conjacental Congress 1781 83 and sent at president elected (1781) inder Activity in Confederation served a yet P 469 See also in I fex

h sturn Hall (Merstand) faile Hanson Timetly New England are ulturat for closs t mothy grass not named A 63

Bannka or Channkah (sun q ka)

Jen al fest vol commemorating re near I survices in Temple at Jeru sale n heb hid deen desecrate i by Ani o hus IV but was restored near the eadersh p of Judas Mac

enhaeus beging with 2.4h day of enhaum beginn with 2.4h day of h d b (December) and asts a days n first night a tande is ighted and on each succeeding is hit new one is a ided also hit new one is a ided also hit was reart of Linghts and Feast of Dedication. See also in Indes

Mac sbees Handman (31 m k mn t j an E si In d an monley M 351-2 pictore M 350

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1 hanging Jears ) Happy Hentisg Crousd | he while mans vers on of the Nortl Amer can Indiane idea of heaven not included in Indon religious

hell of s better (1 a bord German haps byrk) or Hababarg fun on fer men princely fat by which sope of culers for Austria Sen a med finit Poman Latiful 1201-0 A 486-0 Per just of important ru era see in India Holy Homan Limple table, apala history of

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May slurg Loreal e Hause of A 498 Harn (1 tra) Takashi (1926-1921) final commence to become prime master of Japan (1918) and first m n ner of Japan cases; and here prime in ver dire the responsible to parliament previously kader of Setyn kat (Liberal) p rty and three times min star of home af

faire assassinated Hara biri (hārg i ri) spride by

for a Bri (harf a ri) specific by disembowedment | racticed by disembowedment | racticed by Japan obligatory bara kir; for meriy common abol-bed in 19th century but voluntary form in still practiced out of loyalty to a drad superior to axol I dishumer in ballic.

or es protest against a national policy erald See in Index Harold Maralil

Haraii (he rat) Turkey village near Syrlan border ancieni cily Carrae (kar è) ruins Crassus siain bere (Adr s) Fulls Crassus sisin pere
by Parthlans 53 sc map P 15s
larar (ha rur) city in e central
Lithiopia pop 45 000 center
of frittle contee district E 403

s ope E 402 A 48 arbin Manchina See en Inlex Marbin Panktone Herbor See in Index Harbors and

ports Marbord James Gnibris (1868 1947) Army offi er born Bioon Inclor Army office born Bloon Indon Internal III entered Army 1849 as private notable services in World War I formation which is rath net rank of major general chief of sinft A D F 1917 18 commanded Marine breade Jime July 1918 red from Army 192° preedent red from Army 192° preedent

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Bar coort h r William Ternon (18771804) English stateman and do
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way maps N 301 E 424

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Marel tfum See es Index Hardshell clam Hard road See to in les Anthraclie

Hardr coal Set 1 facer Anthractie

Hardr William J (1810 73) solder
fora Camden Conniy Ga grad
used from U S Milary Acaden y
served in Mexi an War and fougli
allEfully as brigniller general in Confederale army

Harten Sir Arib r (1×6 1940) Eng shared 1929 Nobel prire to n edic i e end physiology vill tlans von Euler Cheloin for their research a Into fermentation of sucars and the action of enzyn to in this pro en-Hardr : th rd m) Mart : Illan (t861-1907) German writer and editor

was attacked an tarveral times to prisoned for hostilly I ward trus sian impreialism

Hardraberg (har les be K) tagost prince son (1 3 -1822) Prus tan state-man le suforce i

amplified Baron Heinrich Stein's reforms, including abolition of serfdom.

Hardening metals cyanlding C-532 nitriding process I-245

Hard'hack, a species of spirea S-352

Hardhead sponge S-354

Hnrdicanute. See in Index Hartha-

ardle, James Keir (1856–1915), British labor leader, born in Lanarkshire, Scotland, led the Scottish Labor party (1889) and the Independent Labor party Hardle, (1893); after 1906 leader of Labor party in House of Commons.

Hurding, Chester (1792-1866), por-traft painter, born Conway, Mass.; was first an Itinerant portraft painter; later in Boston and London became successful painter of prominent Americans and Eng-lishmen; work clear and straight-forward and full of character, though lacking in technique. B-252 Daniel Boone portrait, picture B-251

Harding, Florence Kling (1860-1924) wife of President Harding W-128b-9 Harding, Warren Gamallel (1865-1923), 29th president of U.S.: 1923), 29th president H-266-8, pieture H-266

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Hardinge (här'ding) of Penshurst, ardinge (narding) of Penshurst, Charles Hardinge, first Baron (1858– 1944), viceroy of India 1910–16; put into effect Morley-Minto re-forms; loyalty of India during World War I largely due to univer-sal esteem for viceroy; moved eapi-tal to Delhi and held famous "dur-bar" 1911, his grandfather Hause bar" 1911; his grandfather, Henry Hardinge, first Viscount (1785-1856), was governor general of In-dla 1844-48.

Harding grass, a common name for the perennial grass Phalaris sten-optera; native home unknown but grown in California; used as forage plant, grows to one foot, with short branching rootstock, narrow leave Iliae spikelike clusters; also called

Peruvian winter grass.
Hard maple. See in Index Sugar maple Hardness, in physics M-142c diamond D-78

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substances that are hardest A-173 Hardpan, hardened bed of

sometimes found underneath surface soil.

tace sou.

Hard-shell clam, hard clam, littleneck,
round clam, or quahog C-339
shell used as money S-141
Hard song S-211, 213
Hardtack, unsalted, unleavened hard
bread, used by campers and soldiers B-298 diers B-298

Hard times. See in Index Panics and depressions

Hardwar (härd'wär), India, ancient town in Uttar Pradesh state, on right bank of Ganges River; pop. 40,823; Hindu place of pilgrimage; large annual fair; picture 1-56 Hard water W-63, W-72, C-18

soap for S-213

Hard wheat W-115 bread B-295

Hardwood W-186, F-239b, pletures T-180-3, table W-186c greatest center in U. S. M-171

Unrdy, Arthur Sherhurne (1847 19301, mathematician and novellst, born Andover, Mass.; professor of born Andover, Mass.; professor of civil engineering at Dartmouth 1874-93; mlnister to Persia, Rumanla, Switzerland, Greece, and Spain ('But Yet a Woman'; 'Passe Rose'; 'His Daughter First').

ard, Thomas (1840-1928), great English novellst and poet, noted for somber view of life H-268, E-381

are. Robert (1781-1858), chemist.

Hare, Robert (1781-1858), chemist, born Philadelphia; invented (1801) oxyhydrogen blowpipe (this could fuse refraetory metals and therefore hastened founding of platinum Industry), built electric furnace 1839

Hare, William H. (1838-1999), Protestant Episcopai blshop. born Princeton N.J. for 36 years "Apostle to the Sloux" in South Dakota; founded successful boarding schools for Indians Ilnre, animal Sec in Index Ralibit and

Hare, or Lepus, a constellation, chart S-379

Unrebell, See in Index Bluebell Harefoot, nickname of King Harold I of England H-270

Harelly, source of name R-16 Ha'rem, in Mohammedan countries, apartment of a house reserved for female niembers of family; also the women themselves. Life in harein

women tremserves. Life in marein closely regulated by custom.

Hare's-tall grass, a genus, Lagurus, with one species (L. oudins) of the grass family, native to Mediterrahean; grows to one foot; used in beneate as an everlesting. bouquets as an everlasting.

Hare system, or single transferrable resentation, used in some American cities and in some parts of British Commonwealth, which gives minorities representation on elec-tive bodies in proportion to votes received. Voters indicate first, second, or other choices. of votes necessary for election is fixed. If all seats are not filled, A quota surplus votes of successful eandidates and those of weakest candidates are distributed. See also in Index Proportional representation; Preferential voting

Hare wallnby K-2 Harfeur (dr-flar), town in n. France
4 mi. e. of Huvre; pop. 5052;
formerly important scaport; twice
occupied by English in 15th century; pillaged by Huguenots in 1562.
Harrenves (hint/dren), 1998.

Hargrenves (hár'űrévz) English (1730?-78), Jnmes inventor H-269 Arkwright and A-371, 372

place in Industrial Revolution I-131,

spinning jenny H-269, I-131, picture

Hirlug, Georg Wilhelm Heinrich. See in Index Alexis, Willbald Harkness, Stephen V. (1818–88), American businessman, associated with John D. Doglosfallar, Combin American businessman associated with John D. Rockefeller; family have been important philanthropists; his widow, Anna M. Richurdson Harkness (1838-1926). established the Commonwealth Fund; his son, Edward Stephen Harkness (1874-1940), gave large sums to Harvard, Vale, Columbia, and the New York City Medical Center. Harlan, James (1820-99), lawyer and legislator, born Clark County, Ill.; U. S. senator from Iowa, and for

U.S. Senator from Iowa, and for years a Republican leader in that body; appointed secretary of the

interior in 1865 by President Lineoln, whose son Robert married Harlan's daughter. See also in In-

dex Statunry Hall (Iowa), table Inglan, John Murshall (1833-1911). associate justlee of the U.S. Su-preme Court from 1877 to his death; term of service exceeded only by Chief Justlee Marshall; was a liberal constructionist of the Constitution and generally favored Increase in federal power.

Harlan, John Marshall (born 1899), Jurist, born Chleago, Ill.; grand-son of John M. Harlan (1833-1911); chief counsel New York State Crime Commission 1951-53; judge U. S. court of appeals for second circuit 1954-55; appointed associate justice U.S. Supreme Court 1955.
Harland, Henry (1861-1905), Anglo-American novelist, born St. Petersburg (now Lenlngrad); educated in U.S., lived later years in London; "The Cardinal's Saudbox' his

best and most popular novel; edited The Yellow Book. Harland, Marlan, Sce hune, Mary Virginia See in Index Ter-

Harlech (här len), ancient scaport la w. Wales; ruins of Harlech Castle, eaptured by Yorklats 1468. Harlech Castle, in Wales, picture

B-322 Harlem River, N.Y., n. boundary of Manhattan Island, map N-222

Hnrleanln (här'le-kiein or här'le-kin), in pantomime, an amusing and good-natured character; wears tights and mask; lover of Colum-bine. See also in Index Pierrot

Harlegula, a corai snake \$-208 Harlegaln bug. See in Index Stinkbug Harlegaln opni J-350

Harley, Roherf, earl of Oxford (1661– 1724). English statesman, born London; secretary of state (1704). lord treasurer (1711). The books and manuscripts collected by Harley and son Edward are known as the and son Edward are known as the

and son Edward are known as on Harician Collection: L-183

Har'lingen, Tex., elty in lower Rio Grande Valley 225 ml. s. of San Antonio; pop. 23,229; eltrus fruits. eotton, veretables; eotton glas and compresses: maps T-91, U-252-3

Hnrmur, Joslah (1753-1813), soldier, born Philadelphia; served under Washington and Lee in Revolutionary War; unsuccessful in queling Iudian uprisings n. of Ohlo River (1785-87, 1790); adjutant general of Pennsylvania (1793-90),

Harmnt'tnn, a type of wind W-150, S-15 Harmadias. See in Index Aristogiton

Harman, Daniel Williams (1778-1845). Connadian fur trader and author, born Vermont; joined North West Company in 1800 (Journal of Voyages and Travels in the laterior of North America').

Harnnu, Judann (1846–1927), lawyer and polltical leader, born Newton, Ohlo; attorney general 1895–97; governor of Ohlo 1909–12; Democratle nonlinee for U.S. president 1912.

in sound, nn overtone Harmonic, S-238-9

Harmou'lea, or mouth organ H-269-70, picture M-471

Harmonic minor scale, in music M-469 Harmo'nlum, or reed organ 0-424 Harmony, In color C-394-5, 400, color picture C-395

dress design D-150

Harmony, in music M-468a, 460

Harmsworth, Allred. See in Index Northellife, Viscount Haruack (här'näk), Adolf von (1851-1930), German Protestant theolo-

gian an authority on early church history sought to reconcile science and Bible ( History of the Chris-tian Dogma What is Christian Ity?)

William (1812-45) bloneer expressman born Reading Mar ard Virginia (1868-1946) Amer

Mar aird Mrgims (1862-1945) Amer-ican actices created tille role of Trilby 1895 wife and leading wom an of E H Sothern 1998 to 1218 Harness in weaving S 351 Harness for the State of the Mrgims than North Carolina [eader N 278 Permy William 8 (1850-1891)

fran Aorth Carollia leader w zw serny William S (1800 1820) American general won dialincion fighiling Indians in Fiorida Ever slades and in baille of Certo Gordo in Mexican Wer laier fought in Mexican Wer laier fought Indiane in the West recalled from command of Oregon Tarrilory for relying Section 2 celzing San Juan Island claimed by

British Harney Peal highest point in Black Hills named for him Harney Frak in Black Hills in an South Dakota highest point in State (7742 ft ) and in Black H lia Mop S 302 118rnoncourt

Arnoncourt René d (born 1901) Hipsirator of children a booke born Vienne Ausiria now livin United Steles authority on liv(ng art of the Maxican Indian picture books Mexicana Hole in the Wall also I justrated Painted

Pig' by Elizabeth Morrow
Harid I (diet 1040) king of Eng
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Harper Throdore Astand (1571-1942) American writer horn Christ American writer horn Christ church Naw Zealand miling engi-neer in Alaxia Sheria and other paris of world wrote adventura stories for boys many with wife Winfred Mary Hunter Brawn Mar-pec (Siberlan Gold Kubick the Oullaw American Boy) (after Winfram Raine, 1838 1994)

Ouliaw Anchroom Bay)
arper William Rathry (1838 1906)
Semilic scho ar and educator born
New Concord Ohlo firel president
of University of Chicago 1891 to
his death Harner

Memorial Library University of Chi cago picture 1 30 Harprra Serry W Va lown al junc tion of Shenandouh and Petomac

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back S 90

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Harrier a cross country runner T 163 Barrier a hunting dog fable D 158a Barring: Liverd Benry (1848-1909) carlital el rallwey organ ser born Hempytead N Y obtained con trol of and rehebil taled bankrupi

Union Pocific 1698 failed in conject
with J J Hill for control of North Pacific bul finalty dominated railroad world before his death COntest over Northern Securities Co R \$23 fight for control of Northern Pacific

S 389
[deriman Florence J (born 1879)
public official born New York City
manager New York State Petorm
altory far Women 1806 18 only
woman member Federal Industrial Raccious Relations Commusion 1913-16 in hister to Norway 1937-41 wrote From Pinstores to Politics

8 399

Writte Frank Williams Avreil (horn 1891) financ er and statesman horn hen York Cty son of Ddward Henry Herriman che emen of board of Union Pae fic Railroad lend lease expediler to London and Moscow 1941-43 ambassados lo Russia 1942-45 lo Greal Britain 1945 secretory of commerce 1948-

48 roving ambassador for EGA 1948-50 special assistant to Presi dent Truman for loreign effairs (appointed lune 1950) and director ifutati Security Agency 1981 57 governor of New York from 1985 Barrist Thomas (1888 1821) Engipt

mathemal clan born Oxford intro duced some of the symbole and holallons used in algebra loday

hotalions used in algebra loday Haria Abram Lifseeiaj (born 1894) Nagro educatoe born Pichmond Va profesoe and hand ol econom ics department Howard University Washington DC 1926—45 laculty University of Cheixo 1945 profes for affec 1949 with S D Spero wrote The Black Worker N 108 Barrie Cerra May (Edibel (1885—1874) Barrie Cerra May (Edibel (1885—1874) wrote The Black Worker N 10 arrie Corra May (Spite) (1865 1935) writer born Farm Hill Ga h arried Rev L H Harris wh

1935) writer born Farm Hill Ga n arried Rev L B Harris who died 1930 (A Circu t Ridae a Wifa 1930 Book and Haeart) Harris Frank (Holt 1931) American author and critic born in treinad cams to U S when 14 latte lived

emma to US when 14 lathe lived chiefly in Europe edited maga annea in England and US many of his writings notorious for the translatest | The Man Shakerpeare Ocar Widels | The Man Shakerpeare Ocar Widels | Marcia George Washington (1814–1914)

69) humoriet born Aliegheny City Pa jewelry craffiaman and stean boat captam in youth wrote first skeich under pseudonam Sugar tall stories jold in monntalneer

dislect with fresh bolsterous humor t Sul Lov agood Yarns ) Harris J(amrs) Arthur (1880-1930) beelogist and statist clan borr Planistille Ohio head of depart ment of butany University of blin

newola after 1924 author of many technical papers A 229 Farris Jarl Chandler (1949 1908) American author H 271 3 picture H 272

men orisi in Allants A 451 Uncle Pemue stories F 3 | 189-200 pictirs L 814 African source 8 419 Harris Rabert [1849-1919] Canadian Pa nier born Wales noted for por

amen and or the contained and the contained and the contained and contained co

Herris Will am Terrey (1935-1909)

educator and philosopher born North Killingly Conn US com missioner of aducation 1889-1808

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triot born Charles Gly Co Va
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Marrison Consignes Cars (Mrs Bur ton Harrison) (1846-1920) nove is Harrison Consistee Cary (Mrs Bur ton Harrison) (1845-1920) nove is born Vaucinse Va (A Deughter of the South Old Fashinned Fairy Book Folk and Fairy Tales) Harrison Frideric (1831-1923) Eng 18th etorian jurist literary critic

4=Prench & German d gem fo thin then d=French massl(Jens), zh:: French j (\* in azura) k=German gutiural ch

and positivist philosopher (The and positivist philosopher (The Meaning of History'; 'Positive Evopution of Religion, 'The Choice of Books', 'Among My Books')

Harrison, Henry Sydnor (1880–1930),
novelist born Sewanee, Tenn
('Queed' 'V V's Eves')

Horrison, John (1693–1776), English

inventor of devices for improving clocks and watches L-313

clocks and wateries L-313

Horrison, (Lovell) Birge (1854-1929),
painter, born Philadelphia best
known for snow scenes and for
paintings of city streets, especially
skillful in depicting moonlight
twilight, and musty atmosphere,
author of 'Landscape Painting

Harrison, Ross Granville (born 1870) biologist and anatomist born Germantown, Pa, on faculty Johns Hopkins University 1896-1907 nanaging editor Journal of Experi-mental Zoology 1904-46, professor Yale University 1907-38 professor emeritus after 1938, chairman National Research Council 1938-46

Harrison, (Thomas) Alexander (1853-1930), genre landscape and sea punter, born Philadelphia Pa, lived most of life in Paris brother of L Birge Harrison noted for luminous color and delicate line

Harrison, Wallace K(irkman) (born 1895) architect born Worcester Mass, codesigner of Rockefeller Center, New York City and of trylon and perisphere theme struc-ture of New York World's Fair (1939 and 1940), director of plan-ning United Nations site New York City, 1947-52 United Nations buildings pictures

A-400f, U-241 Harrison, William Henry (1773-1841) 9th president of US H-277-8, picture H 277

dispute with Indians and battle of Tippecanoe H-278, T-34, picture T-33

presidential campaign H 278 War of 1812 H-278, W-13 wife W-127

wife W-127
Harrison, N J a suburb of Newark
on the Passuc River pop 12 490
large pump elevator and steel
plants, railroad center map, mset N-164

Harrisonburg, Va city 24 ml ne of Staunton. 10 810 pop turker center poultry producing and processing textiles, Vadison College and Eastern Mennonite College may V-486

Harrison Narcotle Act N-13

Harris Teachers College, at St. Louis Mo city control opened 1857, arts and sciences education Harris threeds T-98

Harrod, James (1742-93?) ploneer and soldier born Pennsylvania, in 1774 founded first settlement in Ken-tucky at Harrodsburg opposed Richard Henderson and his Transylvania scheme took active part in vars against Indians, elected to Virginia legislature 1779, mysteri-ous disappearance from lus home led to belief that he was muidered

Marrodsburg, Ky county seat of Mercer County 60 mi se of Louisville pop 5262, first setticment (1774) lu Kentucky, location of Fort Hariod map K-31 early cabin, picture U-374

Har'rogate, fashionable inland watering place in n Figland 15 mi n of Leeds, pop 50,454, medicinal springs map B-325

Harrow, farm implement A-61, I-62 metmes

primitive type picture E-362 Harron School, English School for

hojs at Harrow-on-the-Hill, 12 ml n w of London, founded 1571 · E-262

Horry E Burroughs Newsburs I oundotion, Boston Mass, established 1928 by Harry E Burroughs to raise cultural level of new sho)

Harry Hotspur. Sec in Index Perev. Sir Henry

Hort, Albert Bushnell (1854-1943), historian and educator born Clarksy lie Pa professor at Har-yard 1863-1926 (Formation of historian the Union Essentials of American History editor of 'American Nation series Epochs of American History )

Hort, John (1711?-79) Revolutionary War leader signer of Declaration of Independence born Stonington Conn

signature reproduced D 37

Hart, Loreoz (1895-1943) lyric writer for songs musical shows New York City with Richard Rod-gers composer turned out many See also in Index Rodgers hlts Richard

Hart, Moss (born 1904) playwright born New York Clty with George S Kaufman wrote Meridy We Roll Along about a writer sloss of ideals Von Cint Take It with You' comedy (Pulltzer prize 1937)
Id Rather Be Right musical comedy about You Deal The Man Who Caine to Dinner sattle on celelirity worship

irt, Nancy, American herome of Revolutionary War among her many heroic decids was the capture of six Tories who came to her cabin in Georgia and ordered her lo prepare food highway through prepare food highway through Georgia to Florida named for her Hart, Sir Robert (1\*35-1911) Anglo-

Chinese statesman as inspector general of imperial Climese customs 1862-1907 placed Chinese national finance on solid footing

Hart, the mature male of the red deer

Harte, the inture in the of the red dee.
Harte, Hret, pen mane of Francis
Brett Harte (18°G-1902), writer of
Western stones H-278, A-229
Hartebeest, of hartbeest, African antelope (Bubahs cama) about 1 ft
high with long face and spreading hoins em ving back at tips graylshbrown -(some species reddish), valued for hide and flesh

Hartford, Conn st largest elty in state emit il and largest elty in central part of state on Connecticut liver pop. 177 307 H-279, C-448, 449, 459, maps C-445, U-253, pt luic C-437

Capitol State picture C-448

Charter Oak C-450, picture C-450 first school for deaf D-25 museum See in Index Museums.

table Hartford, George H See in Indev Great Atlantie & Pacific Tea Comp unv

Hartford Convention (1814) W-14 Harthocauute (har-tha-la-nut') (1019-42) king of England son of Cannte, ruled over Denmark and West Saxons while his biother, Harold I ruled in North succeeded him in 1040 brief reign marked by

min in 1040 brief reign marked by cruchty H-270
Hartlepool (hat'll-pol), England a borough and port on ne coast pop 17 217; adjoining is West Hartlepool (pop 72 597), coal iron orcs, shipyards, iron-and-steel works map E-325

Hortley, David (1705-57), English philosopher, founded associationist school of psychology, held mind is a blank until written upon by schsations sensations being caused by vibration of the tiny particles of medullary substance of the nerves

('Observations on Man, His Frame, His Duty, and His Expectations') Hortley, Ired A., Jr. (born 1903),

US representative from New Jersey, born Harrison, N J; 11 conserutive terms in Congress, coauthor of Labor-Management Relations Labor-Management

Act of 1947 (Taft-Hartley Law) Hartley, Marsden (1877-1943) artist and poet boin Lewiston known for landscapes especially of Malne

Autumn 'Mt Katahdin Autumn P-23a, color picture P-23a

Hartman, (1876-1955).Gertrude tcacher and author, born Philadel phila Pa, writer of unusual factual books for children. The World We Live In and How It Came to Be 'Medieval Days and Ways', Making of a Democracy', 'These United States and How They Came to Be

Hurtm on, Karl Robert Eduard von (1s 12-1906), German philosopher taught that Astence is eval and happings an illusion (Philosophy of the Unconscious')

Harts'horn, spirits of, old name for ununonia A-236

Hartwick College, at Oneonta NY established 1928 as outgrowth of Hartwick Seminary (opened 1797) Luther in arts and selences business ness administration music and music education nursing lights, sir Herbert Habiliton (1879-

1941) conductor, composer pianist born County Down Ireland, condirected London Symphony and Manchester Halle orchestras and after 1932 conducted in Australia and U S ('Ode to a Nightingale', 'Irish Symphony')

Hurun-nl-Raschild, or Haronn-nl-Raschild (haspon'al-ra'shed) (7642-809), Abbasid calam of Baghdad 786-409 scholar, poet patron of learning literature and music, one of greatest jumees of his day, but a poor administrator B-16

'Arablan Nights hero A-292 Huru'nobu, Suruki (17242-70°) Japanese painter one of the lirst great

masters of the color print J-317 Harvirl, John (1607-78), Puritin cicrgyman born London England,

went to America 1637 Harvard University C-50 Hurvird Mount (14 99 ft), one of the 'College' peaks in central Colo-Harvird rado

Harrard Classics E-329 Harvard University, the oldest insti-tution of higher learning in U S founded 1636 at Cambridge Mass for men undergraduate college business school divinity school graduate school of arts and sejences toeducational in design, edi-cation law medicine dental medi-cine public administration public health associated with Hadchffe College for women

Agassiz A-55-6 Arnold Arboretum B-261-2, picture B-261

football influenced by F-231 glass flowers in Botanical Museum,

color picture R-145 Harvard House Stratford-on-Avon S-425

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Massachusetts Hall meture M-136
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President Ellot's influence E-329 Harvard University Library, oldest library in US; formed 1638, in-eluding college and departmental collections is the third largest in US, main collection housed in Widener Men orial Library built 1914 in memory of Harry Elkins Widener a young bibliophile and Harrard alumnus who drouned in sinking of Titan r collections

include paris of libraries of Long. fine theater collection

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Maria caust competed 1855 elevated fallways b 440 Haevey Cabilel (1550 -1531) Fng lish poet born bafir n Walden England made literary alla ka on

Robert Gerene and Thomas allemited in introduce of allem; led in introduce dassical melets into Luglish poetry. Heavey Geesce steines McCiellan (1804-1928) ed for and diplo nathorn Peathin VI editor Aorth American Review Harper's Weekly danacal

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sla n | the Mataurus H 260 (Ind. 1940) German writer of ex-

presidentatic plans I The Con-Marriages Are Made in y ni 'l Heaven ; Hashemite Jordan Kingdom See in Index Trans Jordan Heavinshe Kingdom of Joedan See in

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Haskel Lastings about for Indians at Lawrence Kan founded 1884 hourding school for indians at Lawrence Kin founded 1884 maintained by US government high school and post high school training in 25 vocations including commer tal Irein ag buil trades and mechanical trades bullding

trades and mechanical trades

Rawam Childe [18 v 1J j] impres

slonisti palnier and etcher bora

Bosion Mass known for land

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renarkable celorist and sillital

luminist i Suminer ea Lordis re narke de ectorisi and juminici i Suminer Sea L The Church at Old Lyme )

Hasam ben Sabab (Acs in benea bn ) | d ed 1184) | f under of the accl of | Assasins A 425 Hassler Hass Leo (1884-1612) Ger man composer greatest of his age pup t of Andres Gabriel tune used by Bach N 461

liadai (Aus (14) n Pon an Legion W 6 leagram W 5

W 6 Jiagram W 8
Inalle William Heary (born 1904)
Negro lawyer aducator and pul lic
offi ial born Memilis Tenn dean
of law Howard University 133 ==68
aovernor A yenr Hande 1886=63
becan a first Negro J dee U S Courl
of App calls Oct 1868-841

or Apjeals Oct 1840
flastings Sue (but 1881) producer
and director of marionetes from
Monitority The Committee of the Committ

Carrère John M
Hastings Wacren (1732 1815) first
governor general of India H 280
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Preshylecian opened 1883 arts and sciences business administra ion education music speech

Alexandrella geogesphically pael of Syria after World Wae I of Syria after World Wae I under French mandale of Syria In 1939 France ceded the region to Turkey pop 298 277 1930 sq ml chef e ties Alexandrella gnd

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cottage plot are S 132
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Hall near William (1607\*-51) Max sachusetta coloniel official and re former born E nh id England I red in Salem from 1636 until his death ancestor of hall nei Hawthorne.

Hawthorne
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United States manufactures H-281 "Hats" and "Caps," Swedish political parties H-282

Hatshepsnt (hat-shep'sut), queen of Egypt (1486-1468 B.C.) E-260

temple, picture E-284

Hat'teras, Cape, an easternmost island of North Carolina, separated from mainland by Pamlico Sound; many salling ships wrecked in nearby waters: N-268, maps N-268, 275, 17-253

lighthouse, picture N-268

lighthouse, picture N-268
Hattlesburg, Miss., city 87 ml. se. of Jackson, in yellow pine belt; pop. 29,474; chemicals, navai stores, clothing; Mississlppi Southern College, Mississlppi Woman's College maps M-303, U-253
Hat'to (died 970), archbishop of Mainz: according to legend devoured hy mice in "Mouse Tower" on Phine, near Bingen.

Hau (hon), a small tree (Hibiscus tiliaccus) of the mallow family found in the troples, wood used for boats; inner bark yields a rope fiber.

Wilhelm Hauff (houf). (1802-27).German novelist, short-story writer, and poet ('Lichtenstein', fine historical novel).

iaptmann (hou*pt'män*), G*e*rhart (1862–1946), German dramatist; Haaptmann ran the gamut from Zolalike realism to mystic symbolism; awarded Nobel prize for literature 1912 ('The Weavers', 'The Sunken Bell', dramas: 'Atlantis' novel. Eulenspieccl'. narrative 'Tili poem): G-85, D-133, picture G-84

Hansa (hou'sā), Negro people of n Nigeria; among most intelligent of central Africa, language spread through their activity as traders: spread

N-236, color picture A-35

Hausegger (hour'eff-er), Slegmnad von (1872-1948), German musical conductor and composer, horn Gratz, Austria; conductor in Austrian and German cities; director, Academy of Music, Munich; symphonic poems, operas, choruses ('Barbaros-sa'; 'Wieland der Schmied'; 'Helfried'; 'Zinnoher').

Haushofer (hous'hô-fer), Karl (1869-1946). German geographer, head of Geopolitical Institute at Munich: author of many works on geopoli-tics; influenced Hitler; committed suicide. Sec also in Index Geopolitics

Hausmanaite (hous'man-it), an ore of manganese, found as an oxide in brownish-hlack tetragonal crystals. Haussmann (os-man'), George Eugene Haussmann (08-man), George Engene, Baron (1809-91), French official and city planner; prefect of Seine 1852-70: P-85 Hantboy. See in Index Oboe

See in Index Leclerc, Hantecloane. Jacques Phllippe

Haute Savoie, France. Sec in Index Savoie

Haut Rhia (o ran), department of France in the region called Alsace A-181

Hauy (a-u-e'), Valentin (1745-1822),

Hauy (ā-ii-ē'), Valentin (1745-1822), French teacher of the blind, born Salnt-Ju-t, France B-206 Havana (ħg-vān'a), Spanish Habana (ā-bā'nā), capital of Cuba; largest and most Important city in West Indies; pop. 787,448; H-282, 284, maps C-528, N-251, W-96, pictures C-526, H-284 vellow faver concurred to

yellow fever conquered M-403, G-142

Havana, Act of (1940) L-121-2 Havasu (hav'a-so), Lake, on boundary between w. Arizona and se. California, formed by Parker Dam C-415, maps A-352, C-35, C-414b

Havasupal (hű-vű-su'pi), a Yuman tribe of Indians living in Cataract Canyon of the Colorado River In n w. Arizona.

Havelok the Dane, hero of old Angio-Danish romance, son of Birkabeyn (or Gunter), king of Denmark; set adrift on raft which bore him to Lincoinshire coast, England, res-cued by Grim, a fisherman; married ward of king of Lincoln, and became king of Denmark and of part of England. Grim was re-warded and built Grimshy

Huvel (ha'/il) River, in n-central Germany, a tributary of Elbe; riscs in Mccklenburg and flows s . about 220 mi long, linked by canals with the Oder Rhine and Elbe rivers: B-127, map G-88

Haverford College, at Haverford Pa : Quaker for nich. founded 1833; arts and sciences.

Havergal (hāt'7r-gal), Frances Ridley (1836-79) English hymn writer; daughter of evangelical clergyman daugnter of evaluation to scribble hymns at age of 7. simple expression of deep religious feeling ("Take My Life and Let It Be", "Who Is My Life and Let It Be'. on the Lord's Side').

Ha'verilli, Mass, industrial center on Merrimack River 33 mi n of Boston; pop. 47280, shoe factories. scene of many Indian attacks. map

M-133

birthplace of Whittier, picture M-130 birthplace of Whittier, picture M-130
Haviland, David (1814-79), china
manufacturer, horn Westchester
County, New York; in 1842 established pottery at Limoges, France,
and produced fine porcelain primarily for export to US-in 1964
admitted as partners his sons,
Charles Edward Miller Haviland
(1839-1922), born Manhattan, N.Y.,
and Theodore Haviland (1842and Theodore Haviland and Theodore Haviland (1842–1919), born Limoges. France; in 1892 Theodore withdrew and built at Limoges his own factory which is still in operation; American line of Haviland china produced in U.S. (1842 since 1936.

Havilland, Olivia Mary de. Scc in Index De Havilland, Olivia Mary Harlicek (har'le-chek), Karel (1821-56), Bohemian poet and political

writer; editor of two Bohemlan publications; imprisoned for liberal views, and died one year after re-lease ('Tyrolese Elegies'; 'The Baptism of St. Viadimir').

Havre (hav'er), Mont., city 102 mi. n.e. of Great Falls, on Milk River; pop. 8086; farming: Northern Montana College: maps M-375, U-252

Havre, Le, France. Sec in Index Le Havre

Haw, fruit of the hawthorn H-294

Hawall (ha-tei'e), largest and south-ernmost of the Hawailan Islands: 4021 sq. mi.; pop. 68,350; hlphest point Mauna Kea, 13,784 ft. The name Hawaii is commonly used to designate the entire group of Ha-waiian Islands: H-288, maps H-286, P-17

Hawali, University of, at Honolulu, Hawali; territorial control; es-tablished 1907; arts and sciences, agriculture, applied science, business administration, education, nursing, social work; graduate school: H-290, map H-286 awallan (he-retire)

Hawalian (ha-wi'an or ha-wi'yan) Islands, formerly Sandwich Islands, n. Pacific Ocean; 6407 sq. mi.; pop. 499,794; cap. Honolulu: H-285-91, maps H-286, P-17, pictures H-285, 027 00 287-90

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Hawali National Park N-35, H-288, map N-18. See also in Index Haleakala; Kilauca; Mauna Loa

Charles Boardman Hawes. 1923), author, born Clifton Springs, sea romances for young N.Y.: people; Newhery medal for 'The Dark Frigate', 1924 neers'; 'Great Quest'). 1924 ('The Muti-

inventor; awes, Silas, American inventor; patented the carpenter's square. Manes

Hanes, Stephen (1475-1530), English poet ('Passetyme of Pleasure' and Example of Virtue', allegorical noems).

Hawtlach, European grosbeak G-219 nwk H-291-3, pictures H-291-3, B-159, color picture B-181 Hawk huzzard hawks H-292 falconry F-14-15, picture F-14

head, color picture B-176 nest B-172, picture B-173 skeleton, picture S-191

Hawker, Harry G. (1889-1921), Australian aviator, first to try Newfoundland-to-London flight (May 1919); landed in midocean, rescued by Danish ship; killed in plane crash near London, England, July

1921. Hawkesbury, Oatario, Canada, town on Ottawa River 55 ml. e. of

Do

Ottawa pop 7194 lumber pulp and paper mills map C 72 Hawkryr See In Index Pumppo Nattw Hnwkrye Slate pop lar name lor

Hawking or falrancy I 14-15 sectors T 14 Hawkins. Sir Anthony Itape Ree In Index Hope Anth ny

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Crepis Hawkabill or hawkbill e are turtle 

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Hawksbill Heed in Shenandoah National Pork \$ 385
Hawks Caalle \$ cc | Index Hall hts burg Hawkimooe Nirhetas (1601 1736)

Hawkimone Nirhotas (1601 1736)
Fragilish architest worked 60 intimately with Christopher Were that
It is impossible to a sake exoct ofvision of credit for their work
Westimiser Abby towers West
Hankweed a genue of perenn all pants
(Hieraripus) of the Jam'ly Com

poeliar with loosely clustered jel low orange or white flower heads and oblong toothed leaves that grow from roots to rosette trouble grow from roots or rowette trouble some weed in some places an od supersittion stated that Pawka used the sap to sharpen the reversit orange or tawn) or let I point brush color picture I 175
Hawiry most Tariff Act Introduced by Rept sceniathe Willis C Hawley

(1864-1941) of Oregon and Sena tor I sed 5 most (1869 1941) of Utah 1 assed in June 1970 greatly lacrenced import duties on agricultural and manufi manufactured egricultural products other nations retails led by discrimination against imports

from the U S Haworth (ho worth) England urban aworth (ho weight) Engined upons district and village 8 ml I w of Bradford beautiful moorlands tamous 24 home and bur al place of Charlette Emily and Anne Bronte Bronte museum and

library woolen manutactures Nautical See il Indez Hawerr terms table Haw thern an ernamental shrub

H 294 state flower of Mis flower

nouri color pict re S 384a hedges H 329 Hawttorne Charles Behatre (1872 1930) painter born Lodi III spent boyhood in blaine well known

tor his figure paintings of Cape Cod

1904 books for children based on original sources and personal

brantic Pebel the Story of Sathan hringer Perei the Move of Natural lei Hirsch ruse Touthe Capitaln the Stors of Palph Mailo Piner son The Happs Autocrat 2 Life of Oliver Wendell Holo ex Concorle Happy 1 e el Henry David Thoceau

Nautforse Inlian (1848 1934) chill bluster and auth e horn Boston blust son f Nathan et Hawthorne (Carth Sebastian Strome nov

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age of are carly macesses included to Dear Brulus with William Gillette d stinguisted for charm and dramal e skyl on state in mot on becures on ead o and on relevicion (stage plays Bab Mary of Sot (stage plays Bab Mary dramal r between the control of the

John) married Chaeles Mag Arthue 18°5 In Victoria Pegma pi t re D 135 Hayes I ner Webb (1831-93) wife of Prev deni Ilayes W 128a

Haves I alrick Joseph Cardinal (186 -1934) Re born New Catholic pretate Roman

horn New York City preddent Cathedral College New York City 1903 14 appointed Catholic char tain b Gop for US Army an 1903 14 appn nea Cathone chap-tain b thep for US Army and Navy 1917 and archbishop of New York 1919 erested card nat 1924 Hayes Hanaud (born 1987) Negro-tenor born Curryville Ga concert

tours in U S and Europe noted for singing of Negro spir lunis sang with Losion New York and other leading at mphonics Spingarn; edal 1925 author of My Songe Hayra Rutherford Birchard (1879-911 19th president of 1 5 11 796 9 picture H 295

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ind vidua a "envitive in these pol ness to plant and animal proteins other than pollens

Maymarket slot at Ch cago C 238 Harne Pani Hamilton (1870-85)
poet torn Charleston SC nephew
of Robert Young Horne celled
the la treate of the South
(Cerends and Lyces The Mount

the latreate of the South
(ferender and tyees. The Moun
lain of the Lovers) A 229

Hayna Ridect leing (1791 1829)
statement born bouth Cerolina
ardent null feation advocate best

ardent null Coston advorate best remember of as having sitelled the first of the state of the st (1901) B-

te tain 21 20 Win a and W 148 Wis a and Wide lars Actue (infield (1881-1854) lars and writer for Rockeller Y beyon practice New York City 1000 in will be time gate fundum earse include deque and facco Vanzetii (Themy Imperiy in Americs Let Feerly Ins Democracy Works City Lawyer Have

autohingraphy) Haye Clartes Melrille (1856-1912)
redroad chiclel born P rk (stand
Ill brgen railroading at 17 perved with several compant's brooming prevident Orand Truni Raimay Co of Canada 2810 died in Thomas

d sa ter Heys Witt H (1879-1954) lawyer born Sull van Ind US postmaster general 1971 78 served as presi ent Motion Picture Producers and

Distributors of America 1972-45 advisor 1945 59

munispe 1945 30
Hayward Callf city 13 ml se of Oakland pop 142"2 purseries apricots tomatoes poultry processed frods glass products motor corches sait airport map inset

G 54

Instrator and author of chi dren a loaks born Philadelphia noted for portraits of children books Belsy and Billy Here a Fonny Little Title Lidde ant Gardenia

Itaratas (fil a ros ) Afghan tribe of Mengolian origin A 31

Tearned in soit C 136 Here Bn atmospheric condition caused

11. French's German's gem go thin then u. French pusal (Jeas) ch = French's (e in azure) & Cerman guttural ch

by suspension of fine partieles in the air, making it less elear Un-like fog which depends on moisture haze is often present when atmosphere is dry

Hazel, bushs shrub related to the

birches H-299

eity 9 mi nw of Harel Park, Mich eity 9 mi n w of Detroit, pop 17,770 map, inset 31-927

Hazeltine, Louis A., American inven-

tor R-43 Hazen, Charles Downer (1868-1941) educator and writer born Barnet Vt. professor history Smith Col-1894-1914 Columbia Unilege versity after 1916 ('The French Revolution and Napoleon' 'Mod-ern Europe' 'Alsaee Lorraine un-

der German Rule') Hazen William Balcock (1930-97), US Army officer born West Hart-ford Vt in Army service 1855 until death chef signal officer 1880-87 except during his court-martial (1895) for eriticism of delay in re-heving Greely expedition which heving Greely he had organized 1891 (see in Index Gree'v) important advances in weather forecasting during his service as chief signal officer

Hazing, in colleges and other schools, the infliction of indignities and severe praetleal jokes upon neweomers by uppereiassmen sometimes involves serious injury

Harleton, Pa summer resort and industrial center 20 mi s of Wilkes-Barre pop 35 491 anthracite interests silk clothing steel and iron products map P-133
Inz'litt, William (1778-1830) English critic and one of greatest English critic and one of greatest English

lich essayists whatever his theme he derives the essence of his commentary from himself being in turn metaphysician moralist, hum-morist painter of manners and characteristics, friend of Lamb ('Characters of Shakespeare's Plays' 'Lectures on the English Poets, 'Table Taik') E-380, L-98c II-bomb A-467-9 mentary from himself being

H-bomb A-407-9
H. D. Sec in Index Doolittle Hilda
H'Doubler (do'bler), Margaret (Mrs
Wayne Clayton) (born 1889) educator born Beloit Kan, joined
physical education staff University
of Wisconsin 1910 professor since

1942, developed first dance major eourse in a university, wrote books on dance students at University of Wisconsin,

pictures D-14-14a Head, Sir Edmund Walker, Buronet (1805-68), English writer on art (1805-08), English writer on art and colomial government, lieuten-ant governor of New Brunswick 1847-54, governor general of Can-ada 1854-61 end, Sir Francis Bond, Baronet

Head. English soldier, au-(1793-1875) and colonial governor, served thor and colonial governor, served in Waterloo eampalgn, managed gold and silver mines in South America, lieutenant governor of upper Canada 1835-37, wrote Bubles from the Brunnens of Nassau', 'Highways and Driways', Carlona and Bollogs' 'Stokers and Pokers'

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eals Timoths Michael (1855–1931) Irish leader self-educated through his fiers brilliant eloquenee won many reforms for Ireland first governor general Irish Free State, 1922-25 (The Great Fraud of Ulster, The Planters' Progress')

Herring E-170-1 See also in Index
Deaf Ear Sound
ehildhood C-240a-b

Henring aids D-26

Henro (h/ru) Lafeadio (1850-1904). author born Ionian Islands, son of author form form islands, son or Irish arms doctor and Greek mother, married a Japanese and became a citizen of Japan, pieturesque writing ('Chita 'American Miscellans' 'Kotto' 'Gilmpses of Unfamiliar Japan', 'In Ghostig Japan')

Japan')
'Japancse Pairi Tales' S-409
Hearne, Saomel (1745-92), English explorer, in service with Hudson's Bax Compain, discovered copper mines of Coppermine River basin in Northwest Territory and traced that river to Arctic Ocean, being first white man to reach the Arctic overland from Hudson Bay C-96 Hearsay, in law See in Index Law. See in Index Law.

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ing sehools, public libraries pald cost of architectural competition for University of California, there built and coupped Hearst Memorial Mining Building National Congress of Mothers P-80

Hearst, William Raodolph (1863-1951), capitalist and journalist born San Francisco, owner of string of newspapers from San Francisco to New York and of a block of magazines exponent of sensational journalism, member of US House of Representatives 1903-7

eart H-311-14, color pictures H-311-14, P-240-2, See also in Index Circulation Heart amphibians R-110

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low shrubs i sually confers and beaths may be either excessively. In or ever 11 a wet F 348 Heutheont (Acth Lot) John (1783-1861) Investor for Difficial near Derby England invested important lacemaking match nery Irralineir Caleb (1967) colo-nial merchani and public official

born Derby thir Ingland came to New York in 1132 life member of New York in 1199 life member at Rovemor a c until Julier of West chester County in gyar of Yew York City 1711 it larse inniverse helped estail h Anglinism in Connet tut and New York Italian Cliera The a joet by Brei Higher II 220.

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with bell I ke ft wers H 320

Healt family or Friences ( r i &d
es e) & family of sirrub and trees
of wide listed atton including the

malron drawherty tree sour wood rhad lendron kalmia bear berry bunkledersy llueberry cran berry and trailing arbutus Derry and Iraling arbutus (Ty pratichine Ci) (do) s m lar ti pis re chicken but grandler inhabited whose single and sive chicken are chicken as the chicken m exiled ensiern prairie chicken m exiled the chicken size of the chicken the chicken size of the chicken the chic

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be (he bi) in Greek to phearer to code H 326 mythology (he ben etré akt a) Hebrustrefia (he ben eire ant a) a genus of South African nevential ptants of the fig toot family One species (H homous) grown as annual stems boody flowers in 6 in spikes yellow or white biolched orange red. like intended fra

grant at a ght gram at a gut

Hr her Regionid (1783-18°0) Fag

ligh churchman and hymn writer

hishop of Calcutta ( Holy Holy

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Hebrew Uniteratly Institution higher leathing in Jerusalem Mi Scopus foundri mainly by MI Scopus founds; mainty by the Zionia organizal on opened java science Jewish and Orienial stud-ie numanities medicine law and agriculture neitroston is in Jie fine production of the scopus of more than Job Islands off the worst of Seni-land 2413 as in pop \$3.400 unrendered to Senian 4 surrendered to Senia-to of Senian 4 surrendered to Senian 4 surrende

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Herntomb (hel a tom or lick a tom) in modern usage the destruction of a large number of things originally in ancient Oreace vacation of 100 oven (from leading large) Greek for hundred ) later specifies of any large number levalompedan temple in ancient

Hei alompedan He alompedas semple in sincian.
Athens A 11
Recht Ben (born 1884) guilher born
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Charles MacArthur)

Charles MacArlhuy)
ferker Issat Thomas (1819 88)
Pon an Calholic priest horn New
Tork Cty member Brook Farm
Expairment 1843 converted to
Catholiciam in 1844 and in 1888
founded Wissionary Soc etv of St
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most bateful and unscrupulous ego lats of literature Heddle in wraving S 35t picture

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H 126-7 vapor system 11 324 u=Prench a German il gem go thin then u=French passi (Jegu), sh =French f (g to azure), g =German guillural ch Hedin (hě-dên'), Sven A. (1865-1952), Swedish explorer; explored e. Tur kestan, Tibet, Mongolia, and Siberia; found valuable treasures of natural science in Sinklang province, China ('Through Asia'; 'Scientific Results of a Journey in Central Asia'; 'From Pole to Pole'; 'A Conquest of Tibet').

Hedjaz, Saudi Arabia. Scc in Index

Hedley, William (1779-1843), British inventor L-291 Hedonists (hē'dŏn-īsts), a school of

philosophers P-203

Heel, in anatomy Achilles' heel A-8, 9 human and animal F-224

Heel, nautical. Sec in Index Nautl-

cal terms, table

Heel fly, a botfly that attacks the heels of domestic animals F-189 Heeling ealves, at round-up C-140

Heep, Urlah, in Dickens' 'David Copperfield a malignant hypocrite who pretends to be so "very 'umble".

picture D-84b
Hegel (hd'yel), Georg Wilhelm Friedrieh (1770-1831), German philoso-pher; professor of philosophy at Heidelberg and University of Berlin; founder of the school of absolute Idealism.

Heg'enberger, Albert T. (born 1895), avlator, born Boston, Mass., table A-104

action and the segment of the segmen Heggen, Navy supply ship, was basis of play 'Mister Roberts', of which he

was ecauthor with Joshua Logan. Hegira (hē-gī'ra), Mohammed's flight from Meeca (A.D. 622), from which Moslem dates are calculated M-329

delberg (hibora), Johann Ludwlg (1791-1860), Danish poet and eritie; edited Flying Post; championed Hegelian philosophy ('A Soul After Death'; 'The Newly Wedded'; 'The Nut-Cracker').

Heidelberg (h'děl-bûrē), Germany, university eity on Neekar River; pop. 116,488: H-329-30, maps G-88,

Heldelberg, University of, Germany H-329-30, U-404

library, picture G-101

Heldelberg College, at Tiffin, Ohlo; founded 1850 by Reformed church; arts and sciences, music.

Heidelberg man M-69-70 Heldeastam (hi'den-stäm), (Karl Gustaf) Verner von (1859-1940), Swed-ish poet and miseellaneous writer; ish poet and inscendences writer; won Nobel prize 1916 ('Hans Alienus', fanciful epic; 'Birth of God', 'The Soothsayer', dramas; 'The Charles Men', stories of Charles XII of Sweden and his wars; 'Nya Dikter', poems). Heifer C-141, 141a

Helfetz (hī'fēts), Jascha (born 1901), American vlolinist, born Vilna (now Vilnius), Russia; graduated Royal School of Music at Vilna, at age of 8; made first public appearance at 5 and before he was 18 had won recognition throughout world as master of violin; debut in United States 1917.

Helght, stature

growing child C-240a, A-22 chart

C-240a individual differences I-114 racial characteristics A-264

Height of Land, in Canada L-137 Helghts nud depths. See in Index Altitude; Depth

(hī'čr-māns), Herman Heijermans

(1864-1924), Dutch writer of Jewlsh parentage; first became known through sketches of Jewish family life under pen name of "Samuel Falkland"; wrote several notable plays ("The Good Hope; 'Rising Sun'; "The Ghetto'; 'Links'; 'A Case of Arson').

Heijo, Korea. Sec in Index Pyongyang Hellbronn (hil'bron), town in s. Germany on Neckar River, 25 ml. n of Stuttgart; pop 64,643; machinery, furniture, metal goods, paper, wooden goods; finc Gothic church and Rathaus maps G-88, E-125

Hellpria (hil'prin), Angelo (1853-1907), American naturalist and traveler, born Hungary; professor Invertebrate paleontology and ge-ology, Academy of Natural Sciology, Academy of Natural ences, Philadelphia; made valuable ences, Philadelphia; made Permuda, investigations in Florida, Bermuda, Martinique, climbed erater of Mt. Pelée while volcano was erupting; ehief editor Lippincott's Pro-

mg; enter enter Lappmeon's Fro-nouncing Gazetteer (1905). Hellsberg (hils'bern), Poland, former German (East Prussian) town about 80 ml. c. of Danzig; indecibattle between French and sive allied Russians and Prussians 1807;

included in Poland since 1945. Heilungklang (hā'lung'ġi-àng'), province of n. central Manchuria; area about 130,000 sq ml.; pop 6,000 - 000; eap. Lungkiang (Tsitsiliar); timber, goid, coal; soybean and timber, gold, coal; soybean and flour mills and distilleries; much larger than now, Heilungkiang his-

larger than now, Heilungkiang historically formed, with KIrin and Liaoning, the Three Eastern Provinces of Greater China: M-72, 76 Helmdni (hām-dal'), in Norse mythology, guardian of the rainbow hridge of the gods; can see perfectly day and night; can even hear grass grow; seldom sleeps: M-476c, picture M-476d
Helne (h'nd), Helnrich (1797–1856), German poet H-330, G-85, picture G-82

Helnieln, Robert Anson (born 1907), author and scientist, born Butler, Mo.; graduated from U.S. Naval Academy; ln Navy in World War II. wrote his first science fetter Academy; in Navy in worm war II; wrote his first setence fiction short story in 1939. His books for boys include 'Rocket Ship Galilco', 'Red Planet', 'Farmer in the Sky', and 'The Rolling Stones'.

Heir ( $ilde{e}$ r), or helress, from Latin word heres, a person who is entitled to inherit. See also in Index Law, table of legal terms

Helr apparent, one who will inherit If he outlives ancestor, as eldest son. Heir presumptive, one who will inherit If no nearer heir is born to ancestor.

Heisenberg (hữ zến-běrk), cisenberg (m.zen-verk), Weraer (born 1901), German physicist; professor of theoretic physics Uni-versity of Lelpzig after 1927; in 1932 awarded Nobel prize in physics work in quantum mechanics; P-236

Helsman Memorial Trophy, awarded to most valuable college football player Athletic Club of New York City in 1935 in honor of John W. Heisman, player and coach for 40 years.

Hejaz (hēġ-āz'), or Hedjaz, part of the kingdom of Saudi Arabia; a separate kingdom from 1919 to 1925, when it was eonquered by 1925, when it was conquered by Ibn Saud; area about 150,000 sq. ml.; pop. about 1,500,000; chief map A-285

gold mining A-288 Mecca M-157

Hek'la, or Heela, a volcano in s.w.

Iceland; height 5100 ft.; becomes active at Irregular Intervals: map E-416, pleture I-10b

Heklare. Scc in Index Hectare

Hek'togram, a unit la metric system (3.527 oz.) M-184

Heklograph, office appliance for re-producing letters and other documents; original writing is trans-ferred to a moist gelatin or clay surface by use of special ink, and from this the impression is transferred to blank, dry paper; used for relatively few coples.

Held lalller, a unit in metrle system (26 42 gals.) M-184

Hek'loneter, a unit in metrie system (328 ft. 1 in.) M-184
Hel (hāl), or Hela (hāl'ā), in Scandinavian mythology, goddess of death who ruled over the realm of the dead; daughter of Lokl.

Hele (hd/t/), Peler, also known as I'eler Henleln (1480-1542), clock maker of Nuremberg, Germany, maker of Nuremberg, Germany, credited with invention of first watch about 1500.

Helen, of Troy, in Homer's 'Iliad', most beautiful woman in Greece, daughter of Zeus and wife of Mene-laus, king of Sparta; cause of Tro-jan War: T-190, 192, T-104, picture II-328

Helena (hčl'č-na), in Shakespeare's 'Midsummer Night's Dream', young Athenian lady, in love with Demetrius M-240

Helena, Salut (247?-327?), mother of Constantino the Great; legendary discoverer of the Holy Cross; festival August 18

tomb E-442, picture E-445 Helenn, Ark., shipping point on Mississippi River, 70 mi. below Memphis, Tenn.; pop. 11,236; lumber, eottonseed oil; seene of Federal victory in Civil War July 4, 1868; map A-367

Helenn, Mont., state capital, ln s.w. 48 ml. n.e. of Butte; pop. 17,581: H-330-1, M-378, maps M-374, U-252 Capitol, State, pieture M-377

early settlement M-367 Helenlum (he-le'ni-nm), \$11007.C+ weed, a genus of plants of the com-posite family, native to N. and S. America. Rough, erect plants; leaves dotted with tiny glands; flowers dalsylike, yellow or brown ray florets notelied at outer margins. Plants have been used locally

In medicinal preparations.

Helgoland (hčl'gō-länt), or Helgoland, German Island in North Sea; arca, about 150 acres: H-331, maps N-301, E-424

returned to West Germany, picture W-299b

Hell'ades, in Greek mythology, daugh-ters of Hellos P-187

Hellanlhemum (hē-li-an'thē-mum), or sua rose, a genus of plants, chiefly shrubs of the rock-rose family, native to Mediterranean and N. America. Branching, with ever-green or half-evergreen foilage; flowers in clusters, white, yellow, or

pink; used in rock gardens.

Hellan'thus, sunflower genus S-457

Hellehrysum (hēl-i-kri'sūm), a genus of annual and perennial plants of the composite family, native to Africa and Australla. One species (H. bracteatum) is grown as an everlasting; plants about 2 feet high; flower heads daisylike, white through purple, dry and stiff, hence called "strawflowers." called

Helicon (hcl'i-kon), ancient name of a peak or mountain range in Boeotla, Greece; on the e. slope were a grove and temple sacred to the Muses: P-111

Helicoplar 1kët I köp tër) flying ma chine supported a lely by the thrust from a revolving screw or propeller mounted on a vertical axis A 541-9 army use in A 380 picture A 382 polar exploration neo in picture 1 3508

police department use in picture P 355b Hrligoloud German Island See 41 Index Helgoland

Hrilocealric livery throny that earth and other planets revolve sround sun belloved in an lent times by Artstarchus established by work of Copernicus Lepler Gallico and

ames Bradley Hellodor yellow beryl used as gem Hellogabulus (he h à dit a l'at or Mogabains (An 205 222) lute Roman emperor proclaimed AR 218 Infroduced lule Rome wor

ship of Syrian \* n god sanna. namerake and high pricet he was essassinaled Hellograph a sunlight reflector used in vig alling T 56

Hellophilu Sec 11 In lex Cape slock Hrilopolie an tent culv al head of Nilo della Empli once seal of aun

Nilo della Enypl once vesi in ausi worship in a miciani name of Baalbek Lebanon utop D 138 Keliopsis (As il dp sa) a geno 138 Keliopsis (As il dp sa) a geno 138 son paste family native to worship america Has hecome usuali some places Leave bown wellow rough flowers shows yellow Rough oxeye is II scabra hardy sunflower false cunflower or oveye is II helianthoides

He lies in Greek mythology sun god P 187 Circs daughter of C 309 Coloseue of Rhedes S 105 pleture

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Heliotrope a flowering plant H 331 Hellolynpa garden Volerian Hellolrope winler See in Index Win

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Heliotoa often called aun animat
cule a sante paedopod may est
guif fool or several nay work
together pulsar L 220 a genue
of plante of prompos le family
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nation to the plante L 220 a genue
of plante outstalls and S Afre as
makes the largest group of ever

makes the targest group of ever tasting flowers includes the acre cilnium and rhodanthe or Swar Swan River everlasting Hr lism a gaseums element H 35 lables P 151 C 214 Amarillo Tex H 331 picture T 24 element H 331

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Isolopes picture R 54a liquefied H 331

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Greek Hades H 241 See also in In der Huden Milton's Paradise Lost M 259

Bri les originally a small district to Thessaly ruled by Peleus father of Achilles later applied vaguely to all ancient Greece

Brilbeader a salamander S 26 Hell slives the pled billed grebe dabchick G 187 pictures B

dabehick G 187 pictures B 173 color pature B 179 Brite (IFIa) princess in Greek leg end D I

Hat lebore black See in Index Christ TODS FOR Hellabore while Sec to Index White

hellebore Hellen myth cal founder of Creeks son of Deucalion and Pyr rha falher of Dorus (from whom came Dorians) and grandfalber of

Ion (Ionians) and Achaeus (Achae and) mylh probably grose about national unity descloped among Greeks

Brilenes (helene) ancient Greeks 6 298 Bellenistie zao G 201 202 al Alexandria A 160

hioratura G 218 Heller (heller) Stephen (1814-88) Hungarian composer and plan si

born Rudapes) bis lauch ne studies widely used Heller a former m nor con of Ger 1/100 crown

Heller a former m nor con of many and Auelra 1/100 cr also used in Czechoslovskia Tel lespesi accuent name for danelles D 18 mans G 197 See cloo is la lex Dardunsles Hero and Leander H 349 for De

Vertes bringe of ships P 189 Tell dele rocky narrow part of Esst Fiver New York Clip b 216 bridge preture B 308 See also in In dez Bridge i tile

Heliman Lill on (born 1805) play wright born New Orleans La writer since 1925 characters in 5 characters in Lill e Foxes and Children a Hour Lilie Foxes and Another I art of the Forest selfish and cruel Watch on the Rhine con aelfish

and crued. Watch on the Rhine con-serned with an antifavoist German Searching Wind deals with events leading to World War II—on the Belliviced Hermana (1831—o). Ger n an chamilel demon traired ability of legun inous plants to assimilate free nitrogen of the antifact Grand

Hell & Canyon Sos is I idex Grand Canyon of the Snake P ver See in Index Nautical terms

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Dalmet anceat Greek armor A 376

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World War II ere picture A 377

I live of Levil 1395
World War II ere picture A 378
Worl

Brimet shell v 1335 Brim holts: Harmen and (1891 94) German physici i physiol gist and malhematician invested ophthal mescope symmen in nearly every branch of science sun a heat explained by S 452 lemon Jen Baptisis Helmont Jen Baptleis van (1577-1844) Belgian chemist and physi

1844) Belgian chemist and physical approach first to use term gas distinguished several kinds of gases be eved water the base substance (Ortus Medicina)

STUDIEST APPLIES CONTROL OF CONTR

Ielle Foundation of Los Angoles established 1935 by Paul H Helms American sportsman

Heloderm a poisonons lizard L 283, picture L 283 Héleur (110 ez) (11012-64) lal enied French abbew celebraled for her devolion to Abelard A 3

liri silam in bolasy enslavement of one plant by another L 220 Ilr lets Sparian serfs 9 329 Helpmuss Robrel (born 1909) Eng lish dan er and chersographer born

Adelaide Anstraira debul as solo dancer 1923 in Adelaide jo nec Sadier wells Ballel 1933 choreor jo ned rat her and dancer in a otton picture

The 1 ed Shore greated ballets Comus Hamlet The Birds Helsh el erg Sweden See in Index Halanglurg Hris before

Heleloki Hels seor (hri sing (r') also Dist sorr Denmark seaport on ne roast of island Zealand pop 1010 shipl ulding and commerce scene

Shakes care s Hamlet maps D 71 E 424 Kronlorg Caslio pict on D 60
Helsinki (I il a no ki) Swed sh Hel

resumble (16th a with) Newed to little states are printed capital, and large states are printed capital, and large states are produced by forten and states are produced by forten and the states are presented by forten and the states are presented by the states are produced by the states are

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defected them \$8 s C Helve trus Ciso is adries (1715-71) Helve tus Ciso is Adries (1715-71) 1 rench encyclopedia and utilization philosopher his most famous book De leapul (0f he hp ri) rs sed a clorm was candemned by the Sorbonne end publicly burned Hem in acking 113 Politic Dersthra

Hemans (Ars) und) Fellela Darethra (1793-1835) English poel born Liverpool sentimental brice in Liverpool sentimental brice in clude The Land ng of the Pilgrim

Faihers Casablance Englands Desd and The Greves of a House Hem elin in blood B 208 Hem sills most important from ore (ferric exide Fe Os) I 237 lobbs

M 176
gem J 348
Lulled Sistes deposits Alabama
B 186 7 Minnesota M 278
Hrmalovylis the coloring matter of
loguoud L 296
Later Day III.

togwood L 296
Hemresolits Frs in Infar Day Illy
Hrs lagway Erseal (horn 1898)
Ameri as author H 331-2 A 2301
plot re 11 332

Hemipiera name of insect order some timrs used to in inde at insects

ing braks and income life metam r there Insacis now usually phonis classed in three orders. Hemptera the water bugs chinch bugs bell bugs etc. Homoptera the cleadas scale Inercis ric sphids Anopi ra or Siph inculata the true

See also in Inder P 184 Hrm laphrre of brain L 260 picture B 241

Hemlephrir of earth half of the giobe the earth bring considered as divided at the equator into Northern

and Southern hemispheres or at some point between Europe and America (usually the 20th meridan) into Eastern and Western hemispheres: W-201, dingram E-176

nemspheres: W-201, aingram E-176 Northern Hemisphere, map A-531 Hem'lock, an evergreen cone-bearing tree with needles that are flat and blunt H-332, picture H-332, table W-186h

bank used in tanning L-148

hedges H-329

Hemlock, poison, a plant of the parsley family, with spotted stem and small white flowers P-338, H-332, S-225

Hemlock, water. See in Index Water hemiock

Hemlock spruce. See in Index Western hemlock

Hemoglobin (hem-o-glo'bin), the coloring matter of red corpuscles of blood B-208, B-146

blood B-208, B-146
action imitated with cheiates R-118
Hémon (ā-mōhi'), Louis (1880-1913),
French author, born Brest; went
to Canada; worked on FrenchCanadian farm where Maria
Chapdelaine', story of pioneer life,
a masterpiece of French-Canadian
literature, was written: C-106a
Hemophilia (hō-mō-fil'i-q), a blood
disense B-210

disease B-210

Hemorrhage (hem'o-rag), violent hleeding how to stop F-95-6, pictures F-94-5 vitamin K controls V-496

Hemp H-332-3, pictures H-333, table F-63

cables wrapped in C-6

Manila hemp P-199, H-332, pic-tures R-228, H-333

ope and twine R-227-9, pictures R-228-9 rone

sisal H-333, S-190, pictures R-228 sisal H-333, S-190, pictures R-228
Hem'pel, Frieda (born 1885), German
operatic and concert coloratura
soprano, born Leipzig, Germany;
debut 1905 at Berlin; with Metropolitan Opera Company, New York
City, 1912-19, later a concert
singer; noted roles are Gilda in
'Rigoletto', Mimi in 'La Bohème',
and Marguerita in Taust'

and Marguerite in 'Faust'

Hempstead, N.Y., residential suburb of New York City on Long Island; pop. 29.135; map, inset N-204 Hen, demestic fow P-402-3, picture P-402-402b, See also in Index

Poultry Hen, sage, a large grouse G-221

Hen-and-chickens. See in Index Liveforever

10rever ench. Phillp S(howalter) (born 1896), physician, born Pittshurgh, Pa.; senior consultant on rheu-Hench. matic diseases Mayo Clinic. chester, Minn., after 1926; also on faculty Mayo Foundation for Medifaculty Mayo Foundation for Medi-cal Education and Research after 1928, professor 1947-; for applica-tion of cortisone to rheumatic and other diseases won 1950 Nobel prize in medicine (with Drs. E.C. Kendall and T. Reichstein). Henderson, Arthor (1863-1935), Brit-ish Labor leader; advocate of labor internationalism; foreign secretary 1929-31; received Nobel peace prize for 1934.

for 1934.

tenderson, Keith (born 1883), Scot-tish painter and illustrator; author and illustrator of 'Letters to Helen', 'Prehistoric Man', 'Burns by Him-

illustration, picture E-379
Henderson, Leon (born 1895), economist, born Millville, N.J.; with
Russell Sage Foundation 1925-34; consulting economist WPA 1936—38; member Securities and Exchange Commission 1939—41; administrator OPA 1941—42; became chalrman board of editors Research Institute of America 1943.

Henderson, Richard (1734-85), pioneer, born Hanover County, Va.; head of Transylvania Land Company which by treaty with Cherokee Indians acquired half of state of Kentucky; organized government there with himself as president, but treaty was annulled by Virginia: B-251

Henderson, Ky., port on Ohio River 10 mi. below Evansville, Ind., in agricultural and coal region; pop.

agricultural and coal region: pop. 16,837; tobaceo market; textiles, brick and tile, boxes: map K-30
Henderson, Nev. town 13 ml. se. of Las Vegas; pop. 3643; magnesium refining plant built here during World War II was converted (1951) to produetlon of titanium; ehemicals, manganese: map N-133, picture N-126
Henderson, N.C. sity 40 mt. 20. of

Henderson, N.C., city 40 ml. n.e. of

Raleigh; pop. 10,996; textiles, hosiery, trucks: map N-275
Henderson State Teachers College, at Arkadelphia, Ark.; state control; founded 1929; arts and sciences, education education.

education.

Hendrick, Burton Jesse (1870-1949),
writer, born New Haven, Conn
('Life and Letters of Walter H,
Page', Pulitzer prize for blography
1923; 'The Training of an American', Pulitzer prize for blography
1929; 'Bulwark of the Republic',
'Statesmen of the Lost Cause';
'Lincoin's War Cabinet', 'The Victory at Sea', coauthor Adm, William S, Sims, Pulitzer prize for
history 1921). history 1921).

Hendricks, Thomas Andrews (1819-85), Indiana congressman, senator, and governor; born near Zanesville, Oblo

vice-president of U.S. Sec in Index Vice-president, table

Hendricksen, Cornells, Dutch explorer

Hendrix College, at Conway, Ark.; founded 1664 by Methodist Epis-copal church; arts and sciences.

Henequen (hén'é-kén), a species of agave plant S-190, pictures R-228, table F-63 Tucatan Y-344-5

Hen'glst and Hor'sa, chleftains of first Saxon settlers (A.D. 449?) in England; regarded by some au-thorities as legendary characters,

Henham, Ernest George. See in Index Trevena, John

Hen hawks, or chicken hawks H-291,

Monlein enlein (hên'lîn), Konrad (1898-1945), Austrian-born leader of Sydeten German party in Czechoslo-vakia; worked for autonomy, and transference to Germany of Sudeten region; committed sulcide after sur-render to United States 3d Army.

Henlein, Yeter. Sec in Index Hele, Peter

William Ernest (1849-1903), British poet, author of 'Invictus', ending with the unforgettable lines: "I am the master of my fate: I am the captain of my soul."

Henley-on-Thames, England, town 36 ml. w. of London, famous for its beautiful situation and its annual regattas; pop. 7970.

Henlo'pen, Cape, e. eoast of Delaware D-48, maps D-48, 53

Henna, a small shrub (Lawsonia inermis) of the loosestrife family, cultivated in India, Arabia, and Egypt; leaves yield an orange dye used in coloring hair and leather, and as a cosmetic among many Orientals; the sweet-scented flowers are used in perfumery and embalm-

ing; also ealled Egyptian privet, Jamaica mignonette, and reseda. Hennepin (ên-pân), Louls (1640?– 1706?). French missionary and expiorer H-334

Hennepln Canal (hen'e-pin), or Illi-nols and Mississippi Canal, in Illinois: connects Illinois and Missis-sippi rivers, by way of Rock River; extends from Great Bend to Rock Island: completed 1908.

Henner (e-ner'), Jean Jacques (1829-1905). French portrait and figure painter, influenced by Correggio; best known for luminous nudes in darlish landscape settings.

"He antiling common did, or mean" C-191

Hen plgeon, or Maltese pigeon, picture P-254

Henrl, kings of France. See in In-dex Henry I, king of France;

Henry II. etc.

Henri (h'n'ri), Robert (1865-1929),

painter of portraits, figures, and
landscapes, born Cincinnati; highly Individual and vital.

Henrietta cloth, a lightweight wool dress fabric similar to cashmere, but more lustrous in finish; originally made with silk warp; named in honor of Henrletta Maria.

Henrictta Maria (1609-66), French princess, queen of Charles I of Engiand; state of Maryland was named for her: C-190 Henriquez (én-re'k's), Dona Salomé

Urena (1850-97), poet and educator of Dominican Republic L-127

Henry called corn I (876-936), called "the Fowler," king of Germany and

Holy Roman emperor H-334 enry II (972?-1024), called "fire Henry Saint," king of Germany and Holy Roman emperor; commemorated as

saint July 15: H-334 Henry III (1017-56), Holy Roman emperor H-334

deposes Gregory VI G-214 Leo IX and L-170

Henry IV (1050-1106), Holy Roman emperor H-334-5, picture H-334 investiture conflict G-214-15 Henry V (1081-1125), Holy Roman

emperor H-335

Henry VI (1165-97), Holy Roman emperor H-335

Henry VII (1262-1313), Holy Roman emperor H-335

Henry I (1068-1135), king of England H-335, E-361

son of William the Conqueror W-137-8 town charters granted D-64

Henry II (1133-89), king of England H-335-6, picture H-335
Becket, Thomas B-92
burial place N-243
conspiracy of his sons J-358, H-336
contest for crown S-390
Ireland I-230n
law reforms H-335 E-361, incresses

iaw reforms H-335, E-361: jury system extended J-367

Henry III (1207-72), king of England Simon de Montfort and the Barons'

Wars M-379 Henry IV (1367-1413), king of England H-336, E-363, picture H-336 drama by Shakespeare, chronology

and rank S-129
Lancastrian line founded L-91
overthrows Richard II R-151
revolt of Wales W-3

Henry V (1387-1422), king of England H-336, E-363

drama by Shakespeare, chronology and rank S-129 Hundred Years' War H-446, A-56

longbowmen, picture H-337
Henry VI (1421-71), king of England
H-336-7, E-363

Hin Ire | lines War II 446 killed on order of I duard It E 266

Wars of the It st. It 239 Henry VII (1457-1509) 11: ited II 337 E 364 T 203 alds John Cabot C 9 I lng of 1-ng

chapel in Weslminster Ahley W 59 Ireland I 230a Sir Thomas More W 391

Slar Chamler S 382 Wales progressed in Whiles progressed index W 3 Henry VIII (14 | 1 4 king of Dam land II 337-8 F 364 | f c 11 330

Anne | ley | 221 ckel shrine lealroyed B 92 doll replica refer part re D 122 f and rank \$ 129 Shakesteam thr n logy

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Cieves P 271 col just r P 27t king nf Ireland I 930a kit Thomas More M 391 Wolvey W 181 2 Henry I (1011-50) king of Frence 11 330 Hrnry If (1519-59) king of France

11 339 y 111 (1551-49) king of France II 338 9 Hrney IS

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Herry of Bloly (b) uj (1101 71)
bleshon of Withester and papal
legate brother of king Stephen
quarrated pick latter upon resease
of privacy and for a time sun
ported Mat idea schims to throne

Henry of Navatre \cc See n Indes Henry the Lion (1229-91) duke of ienry the Lion (1222-91) duke of baxons and Lav file and of liency the Proud son niav of Henry II of England by series of wars ex-tended power of his duchies in face of opposition of Hohensishen em perms d 2226

(1394 1460) Henry the Navigator (1394 1 prince of Portugal II 340 1 Columbus Indusaced by C 417

Porluguese emp re extended P 300 tomb P 379 80 tomb P 379 so they the Proud (110s\*-23) duke of Saxony and Bataria ded fichl ing lo hold he duchies each Cunrad III whose comity he had earned by perichaling in a war against the Hobenstevices

Henry Alexander (1739 1824) nudian fur trader author of author of Trav els and Adventures Henry Andrew (1775? 1833) trepper born York County P4 one of founders of Missouri Fur Co pany

(1909 9) undaunied by Blackfrei (1808 9) undumped by Blackfred Stlacks explored and Irapped on upper Mireourj and buill I't Henry near mouth of Snale Fixer Jined Avhies b. Roed Mountain Tur Compeny (1829) Breeted Irappin near mouth of Yellowston and Creen Valley (1822) won Creen Valley (18°2-24) fronlier reno vn for herolam

Henry John mythical Negro hero of proligious strength worked him self to death trying to beat a ma chine usual 3 a rock drall or according to another version a cot ton rotum mac() re legend has been traced to drilling of Big Bend luncel in Summers County W Va 1870-72 | \$199 pm/ re F

drama Iy Shakespeare chronology an Liand S 129 four ley ton College W 158

Henry Joseph (1797-1878) physicist born Albany N Y develope 1 horn Albany NY devel melhods for weather forcessti d scoteries electromagnelic induc-tion E 304 308 oscillatory nat re-of Leaden lår discharges it 42 Hall of Fan e John H 240

Hrnry Mackacotte (born 1902) an thoe b ra Mhankee Wis at are

11 began professional career 28 marazines known chieft for books for chillren (Benjan a West and His & Clington West and Characteristics of Characteristics of the West Charac Ch nesteague King f the Win I awarded Newherv medal 1949

Ch neoteagus King i ine win i aw trided Newberv medul 1949 A bur f Hoppier Inter o le name of William Sad neo Porter 11852-1 1) An erlean short at ry wr ter P 378-6

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Henev E Munitington Library on t tri follers Son Mac no Calle given to the public by Henry E Hunting ton in 1927 contains a fine collecton in 1927 contains a fine rollec-tion of English 18th century early Italian and Flemish paintings and other objects of art also fore books and menuscripis in fields of history and hisrature L 197 pictire U 251 The Blue Boy See in Lidez Blue

The Henry Esmond govel by Thuckeray T 108 100 Mearsette Okla city 55 ml a o Th sa in rich coal mining district abundance of fuel gas zinc rmel lers large glass fectory pop 7987

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lieney Francis du Font Winterthur noted for 5 ml nw of Wimington collections of colonist Ameri ern decorative arts

econ interiors pefares A 202-3 Hreey Hudson Bridge New York City See by Index Bridge tuble Henry Bushon Jerkson New York City N 222

nenry Street Settlement social settle ment in New York City founded 1893 by Lillian D Wald

1897 by Jallian D. Wald firn selel Sir Cestrie (18.0-2924) En dish musical director composes and singse born Breshau Cermany sixt en Luctor of Boston Sympiony Orchesiva 1881-84 founder and confluctor of I onder Symphony Orchestra 1804-05 t Stabel Maler an oratorio "abla opera A Sea Change comte opera!

Benschke Urred See in Index Kla bund lirnelowe 1 bills (died 2018) English theatrical manager in when cul manager in whate is playe by famous Ftize dramatists were produced thealers

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nished hasis for Uncle Tom s Cab In 8 424 Hrnson

rnson Matthew Alrunder (1806-19-5) Negro who accompan ex Rear Adm ral Peary to North Pole born Charles County Md P 108 picture P 850 Mrn ty George Alfred (1832-1902)

rnly George Aured (1632-1502)
Finglish author soldler and war
forrespondent Writer of boys ad
tenture stories of his fit odd books came of the hest are in Freedom a Cause Inder Droke's Flag in Times of Peril The I on of the North

North

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Rephysic Lames Science of Hilling Peters Rephorn (http://www.hillings.com/hillings.

Peppourn law 1: 225
Peppou Hennieuhite George (died 1788) English furn tute maker whose

de scale gracefu chairs were lighter and amailer than Chippenda as and had typ cally straight slander legs his pieces were chitecletized by simplicity and tenned a egance furniture I 175 p ctyre I 193 Turnilure 1 173 Peters 1 183
Replamecon (Greek seven deys)
collect on a constituter made by
seven services at court of Mer
guerie of Valole for Navarra)
in ital ve of Eccecume Decen
erom impotiant in history of

French literature Heatane in the pistry Sas to Index

laraff'n series Heplarchy Ihe; fur Li) Greek word mean og seven kingdoms ap applied

der Angles and lazons-hent sex Wessex Essex Northumber land East Angl a and Mercia Term is misleading so the number of Meptateuch

septateuch (hepita (h) the first seven books of the Old Testament ers (lera) in Greek mythology ers (ferd) in Greek militality queen of the gods wife of Zeus Henlified with Forman goddess Juno H 341 R 132 H 341

how le to lier ules II 542 jealous of lo I 204 t judgment of Paris T 190

Hermira an lent lown in Asia Minor Sr. (1 Int x 1 10g)
Hermira battle of ( 80 s.c.) Italy

Iteruelen Sec it I der Hercules Hemelthes

terucira Ses (1 / dex Hercujea lemcifaes or Herachidra Poniteua tâte n kl de pôn (1 kms) Greek ph losopher of 4th cantury ac born Herachea in Ponitur reputedly fira to applain that the apparent cola to an of the heavens is brought about t on of the neares is brown a exaround the earth

Heraclitus ( $h \ell r$ -a-l:l'itis) (540?-475? p.c.). Greek philosopher. called founder of metaphysics: taught that constant change from being to not-heing is fundamental principle of universe, and that all things are part of one primary substance, fire; because of his somber view of life he is sometimes called the Weeping Philosopher or Dark Philosopher.

ronosopner or Dark Philosopher.

Heracilius (hēr-a-līl'īs) (575-641).

Byzantine emperor, son of one of
Emperor Maurice's generals; killed
Emperor Phocas to avenge death
of Maurice and became emperor
610; saved empire from Persians,
who had conquered Syria during
reign of Phocas: who had conquered Syria during reign of Phocas.

Heraklelon, Crete. See in Index

Crakleion

Herakles, See in Index Hercules Herald, court chronicler of Middle Ages H-341

Heraldry, science of armorial bear-ings H-341 flags follow heraldic rules carly

F-122 Herut (he-rat'), fortified city in n.w. Afghanistan in province of same name; of strategic importance; pop. 75.642; caravan center; once capital of Timur Leng's empire: maps A-33, A-406

Herbarium F-181

world's largest B-261 Herhart (her'bart), Johann Friedrich (1776–1841), German philosopher, psychologist and educator; Influ-enced by Fichte and Pestalozzi; occupied chair of philosophy at Künigsberg 1809–33; contributed to development of psychology and pedacogics ('Psychology as Knowl-edge'; 'Psychology'): E-245

Herhert, George (1593-1633), English poet, born Wales; saintly pastor of Bemerton, England, near tor of Bemerton, England, near Salisbury; 'The Temple: Sacred Poems and Private Ejaculations' is full of quaint artificialities but contains some of the most treas-ured English sacred lyrics ('A Priest to the Temple, or the Country

Parson', prose).

Herbert, Victor (1859-1924), Irlsh-American cellist, conductor, and composer H-342, picture H-342 light operas O-398, H-342

Herbiv'orous animals, those that feed on plants A-250 stomach R-254-5, S-401 Herb Robert, flowering plant G-82

Herbs, plants without woody stems in which the stems and foliage die to the ground in winter; such plants are often called berbaceous; herbs may he annual, biennial, or peren-nial. The term herb is especially applied to those herbaceous plants used medicinally, as vegetables, or for flavoring and garnishing: P-289-90

flavoring herbs S-341: mint M-291-2 Herculaneum (hêr-kū-lā'nē-nin), ancient Roman city near Mt. Vesuvius, huried with Pompeli A.D. 79: P-366-

8, map P-367 excavations P-367-8

Hercules (ħērkū-lēz), or Heracles, hero in Greek and Roman mythol-ogy H-342-3, picture H-342 Hehe, wife of H-326

Olympic Games founded by O-381 Hercules, constellation, charts S-377. 381

Hercules, Pillars of, See in Index Pillars of Hercules

Hercules beetle B-108, picture B-105 Herder (herder), Johann Gottfried von (1744-1803), German critic, philosopher, and poet: Kritische Wälder (Critical Forests); 'Ideen

zur Philosophie der Geschichte' (Ideas Concerning the Philosophy of History)

influence on German literature G-130, G-84
Hérédia (á-rā-dē-a'), José de (1842-1905), French poet, born Cuba; modern master of French sonnet influence on Canadlan literature

C-106 Herediu, José Marín (1803-39), Cuban poet, cousin of above L-127, picture

1-125 Hered'ity, transmission of qualities from parents to offspring H-343-8, B-151, pictures H-343, 345-7. Sec also in Index Breeding; Evolution; Plant Improvement

chromatin H-344, 346, B-148, color picture B-149 colchicine Influences in plants P-307

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feeble-mindedness due to H-348, M-172 fruit fly used in study H-346, F-189:

chromosomes, picture H-347 Galton's techniques B-154 genes, function H-347-8 individual differences caused by I-113 Mendel's laws H-344, B-151, E-452, diagrams H-345

mutation E-452-3, H-348 relation to sociology S-221

reversion to type: goldfish G-135; pigeons P-254 Zola's novels deal with Z-352

Hereford (her'e-ferd), or Herefordshire, inland county in sw. England on Wales border; 842 sq ml.; pop.

127,092; cap. Hereford: map E-347 Hereford, England, county town of Herefordshire, 120 ml, n w of London; 11th-century cathedral; pop. 32,490: map B-325
Hereford (hēr'-fērd, in U.S. ehiefly hūr'fērd), breed of cattle, commonly

red with white markings C-146, pictures C-143, A-62, A-142 brought to U.S. A-63 Brahman-Hereford crossbreeding

C-146, picture C-144 calf, picture C-141

"Here lies one whose name was written water" K-19
Herero (hē-rā'rō), a Bantu people of s.w. Africa, color picture A-35
Here's a Ball for Baby, game P-319
Here's a Ball for Baby, game P-319

Heresy, teaching opposed to estab-lished rellgion or rellgious author-ity. Sec also in Index Arianlsm; Inquisition; Reformation, Protestant Aheiard A-3

Albigenses, Philip's crusade P-190 Huss hurned for H-452 Savonarola burned as heretic S-52

Waldenses massacred for F-276 Wycliffe W-314 Hereward (her'e-werd) (111b

tury), English patriot outlaw; led Saxon resistance until driven from fens of Isle of Ely by William the Conqueror; hero of Kingsley's 'Hereward the Wake'.

'Hereward the Walse'.

Herford (hēr/frē), Oliver (1863-1935), American humorist, artist, and playwright, born England ('Kitten's Garden of Verses', 'Cbild's Primer of Natural History'; 'The Florist Shop', play).

Hergesheimer (hēr/gēs-hī-mēr), Joseph (1880-1954). novelist, born

seph (1850–1954), novelist, born Philadelphia, Pa.; studied to be a painter, but turned to literature ('Tbe Three Black Pennys'; 'Java Head'; 'Cytherea'; 'The Bright Shawl')

Hering (hā'rīng), Ewald (1834-1918), German physiologist and psychologist: advanced theory of four colors occurring in pairs as opposed to three-color theory of Helmholtz. Her'kimer, Nicholas (1715?-77), American Revolutionary War gen-eral; defeated British at Oriskany, N.Y., but was fatally wounded.

Hermon, Woodrow Wilson (Woody) (born 1913), composer, clarinetist, saxophone player, and bandleader, born Milwaukee, Wis.

Hermann, or Arminins (17 B.C.-A.D. 21), German chieftain who destroyed a Roman army at the battle of Teutoburg Forest.

Hermannstadt, Rumania. See in Index

Hermaphrodi'tism, existence in single plant or animal of both male and female reproductive organs.

Hermas, a Christian writer said to have lived in 2d century; sometimes identified with the Hermas in Rom.

xvi, 14. author of mystical allegory 'The Shepherd of Hermas'.

Hermes (herma'z), in Greek mythology messenger of gods: Roman Mercury: H-348, picture H-241

Odin identified with Mercury O-340 Perseus and P-154

Praxiteles' statue of 'Hermes with the Infant Dionysus' S-77, picture S-77 G-204-5.

protects Odysseus C-309 slays Argus I-204d

Hermes Triamegistus ("Hermes the thrice greatest"). Greek name of Egyptian god Thoth; reputed author of Hermetic Books, encyclo-pedic works on Egyptian religion, art, and selence.

art, and selence.

Her'min, in Shakespeare's 'Midsummer Night's Dream', daughter of Egeus, in love with Lysander M-240

Hermione (hēr-mi'ō-nē), in Shakespeare's 'Winter's Tale', wife of Leontes W-160

Hermit, Christian M-354

Hermitage, art gallery in Leningrad T.-163

Hermitage, The, home of Andrew Jackson J-288

Hermit crab, a type that lives in an empty moliusk shell C-504, 505, picture C-504

Hermit Klogdom (Korea) K-64s

Hermit thrush T-126-7 state bird, table B-158

11ermon, Mount, mountain in Syria 30 ml. s.w. of Damascus: 9400 ft.; Arabic Jebel-es-Sheikh: map B-138 Hermopolis Porva, Lower Egypt, Sec in Index Damanhur

Hermosa Beach, Calif., clty 15 mi. s.w. of Les Angeles, on Pacific: pop. 11,826; residential; hand printed materials; ocean aquarlum: map, inset C-35

Hermoop'olls, or Hermopolls, Greek clty on e. coast of Island of Syra; capital of Cyclades; shipbuilding and commercial center; exports to-bacco; pop. 21,000: map G-189

Hernández (ér-nan'déz), José (1834-86), Argentine poet L-124, 125

'Hernani' (ér-nà-né'), tragedy by Victor Hugo; Count Hernani, to fulfill a pledge, ends life just as love, wealth, and high dignities are his; Verdi's opera 'Ernani' founded on tragedy: H-441

on tragedy: H-441

Herndon, Hugh, Jr. (1905-52), American aviator, table A-104

Herndon, William H. (1818-91).
lawyer, born in Greensburg, Ky::
mayor of Springfield. Ill.; law
partner of Lincoln and author in
collaboration with J. W. Welk of
'Herndon's Lincoln' and 'The True
Story of a Great Life': L-247

Herne, Jomes A. (originally James
Aherne) (1840-1901), actor and
dramatist, born Cohoes, N.Y.: skillful in depiction of rural life and
everyday types of character ('Shore

Acres Margaret Fleming ) A 231 Hero or Heron of Alexandria (first contury a b ) Greek malhemalician and writer steam engine S 390 perture \$ 341

liceo and Leander lovers in tangus Greek legend H 349 Her oil 1 the Great king of Judea

(37-34 BC) 11 349
orders children slain B 133 J 339
Tower of Dwid pleture 1 336 Heeod tackpin I (10° ac Ab 441 king of Julea a quired lerritory

king of Julea a quired territory equal in extent to that of his grand lather Heeod the Great fay red Jews and persecuted Christians Heroit Agel; pa II (an 27-166) sum of above live king of family of Heroid the Great ht Paul was fried

before h m al Caesarea ffered Anticus tetrarch of finitee (4 ac ap 15) H 349 Mecoding (kd rd in ag) wale of Hero i ingligator of the behending of 1 hm

the Baptiel H 349 Recodoles (he rad d | a) (4949 45 2 BC) Greek hislogian lather of history H 349
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Inner H.543-30 cattle herein or buffalo bird B 341 compared with crazes C-307 erret H.342 80 351 private H 350 Auduban paintling picture A 471 tood of young P 174 great blue H 350 private H 342 color pirture B 130 private H 342 color pirture B 130 private private B 150 private B 15

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nest H \$50 picture B 173 Meron of Alexandria. See in Index Hero Mer onry nealing and breeding place of herone H 550

or herone H 552
Hero of the Soviet Union Pussian decoration of honor D 40
Herophilms (heroff las) (flour hed 300 no) Greek surgeon born Chalcedon in Bith nis helped found Langiceum in Bithynis helped found achool of analomy Alexander among first to carry on post morient examinations made im 1 triant studies of nervous system M 1645

(le rôs tra | el Hecoslealus century BC) Ephysian who set flee to lemple of Arlemis S 105

to lemple of Arlemis S 105 [167 all left mill (arg.) I aul Lonis Tousanhof (186, 7-1914) French melalluerist d scoverer of method of separating aluminu n A 184 H 239 [Heepelodgy (här gl 1670 yll lewelence ueaking with it explices See 1; India 1 epilles replices See 1; India 1 epilles

Here German | He of polite address lo a man Herrera (dr rura) Alphonse (boen 1868) Mexican biologial director biology division Mexican depart

held all matter meni of agriculture held all matter capable of life under proper con ditions was able to imitate living cells with manimate substances in laboralory
serece Ferenado do (1584-97)
Spanish lyric and spic poel for
eign influence shown in his work /158.5-071

eign influence shown in his week did much to enrich the language ferrees Francisco de (1576-1856) called el Viejo (the old) Spanish

painter engraver etcher and ar chitect born Seville noted for enticet sorn Seville noted for genre and rillipous paintings (Last Judement in church at Seville St Basil Detaing H ; Doctrine in Louvie) His son beanelsen called et hope (the

young) was painter to king Pi slip Overshoff (her és 1 is) John Bronn (J841-1912) blind at lpb lider and yachi divagner bern Bristol P I member of a family of shipbulders

and founder of arm whe h designed yachia thai defended America s erlik Myron T (1854-1979) enlly islum I diplomat born Huni Hee risk (1854-1979) Ohic started cural cred ! Inst n

Dhio 1907 8 a governor Ohlo I rance 1919-14 1991-29 Herrick Rolert (153) 16 4) Fn hith hirk poel Cermin a Masin, Alichi Prece to Julia Cacher 1 I vel de in lother de kals e

•× if held of in 1 other de Iralis ex ijulis fo units parmoned verse pub I shed in book Hesperides D 578 Heelek Robert (1814 1924) novel lat both (m 1ridge Mass pro-teur al f mersil) of Casago 1895-18-1 general secretary 1895-19-1 general secretary of Viggin Islands 1935 38 works deal

Viggin Islands 1953 on worse were with a dean hile real to I The Connon Lot Topether A Life fra Life The Constript Mother Connot Lot Tupether A L for a L to The Lona riph Moher Chimes The End of Desire ) Hersin III cash muning center in x of state 10 mln w of state n pep 3331 matchine whope foundries ponder plats of 187

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lake or cisco V. 121 Pince in food chain pect re F 10g Plankton their only food F 100 young sold as eard net S 44 Heering family the Cl pridue (Light

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Floward (born 18 179
retried (er e 3) Floward (bore 1672) French stalleannan distinguished at a holar man of lellars and rad cal political leader preculer and rad cal political leader preculer and rad manager french saffare 1822-25 and again fit 1976 and 1933 nayor of Lyons and president of The chumber of deputter in German chatody 1942-45 (Life and Times of Berthoven United States of

of Beethoven Europe J Het schel Carolina (17:0-1844) Pag let astrono ner lorn Germany i decovered five comets for John F W (1792 Hers bel Interest Sir John P. W. 1122-itrachei Sir John P. W. 1122-Intil Deglich gatronomes 80% of Sir William Herschel d scovered The William Herschel d scovered

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first to use terms positive and regative in photostaphy biteprint process B 212 Israchel Sie Hilliam (1758-1822) English attrenomer and organiet born Hanover Germany developed Harachal study of fixed stare and discovered copy of Fren mare and developed 5000 star clusters proved motion of solar system through space dis covered planet Uranum 1781 infrared rays I 188

telescopes T 47

Herschel Sie William J (1833-1917)
Erli sh official son of Sir J P W
Herschel and grandson of Sir Wil llam Herschel inventor of system

of fingsrprint identification

of finesprin identification

Herechell Frara Rese, all frai

Reen 11827-99; urd chancellor of

Balani In 1884 and aga n 1892
Balani In 1884 and aga n 1892-

194. Pulitzer prize w nner deama lived on stage and in mol on pic Jewish resistance in Warsaw 1939-

Bershey Lewis Blaine (barn US Army office barn bleuben County ind War Department sen eral wint 1938-40 director of eral wast 1938-40 director of Scientise Service System 1941-40 and after 1949 director of Select tive betylor Pecarde 1347-46 Breshey

confectioner and philanthropist born Dauphin County Pa built up y founded not for or Bige chocolate industry Hershes Industrial Srh

Horriss Judusical School for or his object to the horse is threshed by in 1900 at 1911 in the horse part of the horse pa

Beritor | College Oxford England G 434 Heetngenbon | Sec 4: Index

alles Deschooch
Berty Charles Holmes (180-1874)
Chemist born Milledgeville Ga
professor of the wire, at Universe
editor Jose of [7] attend a
Eng set my C'e site, 1817, 1817-18
Eng set my C'e site, 1817-1817-1817
Emphasi years in research in dye
turn-nin and maper industries

For P. 200-2 P. 200 years 18 304

German American musiken Sorn a Herlogenbosch

German American musician German American musician born Frankfort at Meiropol tan Opera House New York City 1902 13 d rected Erei performance of Was nee a Parsifal culvide of Bay retults dire to San Francisco Syni phony Orchesira 1012-40 inkuga raled concerts in 1101/wood Bowl

Lot Angeles sela Cualay (boen 1987) Cerman physici i Ses giso in Index Franck riecla. James

Herts Belt elch Rudolpl (18.47 terts Heli che Rudolp) (1827-98)
Gestuun physic at born at Ham
burg borame assisiani lo Helio
bulg at Berlin professor of physic
Luttersity of Bram peincipal
stud es extricul lainding Heri
zian waves laier developed into
radio E 303 P 215 P 29 picture

cathode ray studies X 329 radio ( Herizian ) wayes discovered R 42-3

R 64-5
Heris Henrik (1798-1870) Dazleh
poet and dramalist of Jewish par
culage fromanic feeling and grace
ful et; e (King Renee Daughler,
Svand Dyrings House)
Herizian wees a term sometimes
used for fadlo waves P 42-3 See
also is inder Radio a johnal waved
litert and Janete (Linet) Hanalk (1800)

umFrench u German a gem go thin then na French manni (Jen 1) nh mFrench f ( In aguet) na German guitoral ch

1942), South African statesman and general; premier and minister for native affairs 1924-39; lcader of old Republican Boers; after 1924 modified his anti-British policy; delegate to British Imperial Conference 1926: S-202

'Herre Riel' (cr-va' re-yel'), poem by Robert Browning about a Breton sailor who piloted the French fleet safely into St. Malo after its serious defeat by the English and Dutch off Cape La Hogue in English Channel (1692).

Hervey Archipelago, in s. Pacific, Sco

in Index Cook Islands ervien (êr-vê-yû'). Paul Ernest (1857-1915), French playwright and novelist, born Neuilly; first Hervien wrote under pseudonym Eliacin; noted for brilliantly constructed plays which exposed social evils and

suggested remedies for them. Herzegnvina, See in Index Bosnla

and Herzegovina

Herzen (hert'sen). Alexander (1812-70), Russian author and publicist; political writings, secretly circulated in Russia, stirred up revolt against Russian absolutism: R-295

Herzig, August Albert Theodor (1846-

1919), German sculptor 'Echo', statue, picture E-210

Herzl (hert'sl), Theodor (1860-1904). Hungarian Jew, founder of modern political Zionism P-46

memorial parade, picture I-257 Herzog, Maurice (born 1919). French mountain climber and engineer, born Lyon, France: in 1950 led nine-man French expedition which scaled Annapurna in Himalayas; wroteofexperlences in Annapurna; on lecture tour in U.S. 1953. See

also in Index Annapurna
Heslod (hc'si-od) (ath century E.C.),
father of Greek didactic poetry

G-209

Hesper, or Hesperus, name given by Greeks to evening star; the son of Eos (Aurora) in Greek mythology; at first considered to be same as Phosphor, the morning star; later believed to be his brother. Hesperia (The Western Land), name

given to Italy by Greek poets in

ancient times: map G-197 Hesperides (his-peri-die), in Greek mythology, sisters, supposed to be mythology, sisters, supposed to be four in number, symbols of love and fruitfulness; figure in stories of Cadmus, Thetis, and Atalanta Hercules obtains apples of H-343 Hesperis. See in Index Sweet rocket Hesperus. See in Index Hesperis.

Hess, Alfred (1875-1933), American pediatrician and pathologist; discovered treatment for rickets: V-498

Hess, Myra, Dame (born 1890), English pianist; at age of 12 won scholarship to Royal Academy of Music; debut at Queen's Hall, London, 1907; appeared widely in Europe, and since 1922 also in U.S. and Canada; famed for rendition of

Canada; famed for rendition of Bach, Mozart, and Scarlatti.

Hess, Rudolph (born 1894), deputy leader of German National Socialist party; assisted Hitler in writing Mein Kampf'; Fuehrer's deputy in Reichstag after 1932; flew to Scotland May 1941, landed by parachute, surrendered to British; kept prisoner, his peace proposals reprisoner; his peace proposals re-vealed Sept. 1943; sentenced to life imprisonment for war crimes Sept. 1946: H-385, W-257

Hess, Victor F(rancls) (born 1883), American physicist, born Waldstein, Austria, became U. S. citizen 1944; "for his discovery of cosmic radia-tion," he shared 1936 Nobel prize in physics with Carl D. Anderson; since 1938, professor of physics, Fordham University, New York City: R-32

Walter Rudolf (born 1881). Swiss physiologist; director physio-logical Institute. University of logical Institute, University of Zurich: for discovery (through experlments on cats and dogs) of how certain areas of the brain now certain areas of the brain govern organs of the body, shared 1949 Nobel prize in medicine and physiology with Egas Moniz. Hese (hese), Hermann (born 1877),

Swiss novelist and poet, born Germany (Swiss citizen after 1923); Nobel prize in literature 1946 (novels: 'Peter Camenzind', 'Death and the Lover', Magister Ludi') Hesse (hes or hese), German Hessen,

state and former duchy in s.w Germany; 2970 sq. ml; pop. 1.347,000 many; 2970 sq. mi; pop. 1.347,000 agriculture, lumber, winc; coal and fron; leather, cloth chemicals; after World War II, state enlarged by addition of part of Hesse-Nassau (area of new state 8153 sq. ml.; pop. 4,323,801); map G-88

Hesse-Chasel (Läs'd), former German electorte, included Australia in Austra.

electorate; joined Austria in Austro-Prussian War (1866); annexed by

Prussia.

Hesse-Nassau (nd'son) former province of Prussia, Germany after World War II, Incorporated into Hesse.

Hes'sian fly, a gail midge H-351, color picture I-154d

control methods A-63 fossil ancestor, picture A-186

Hessians, German soldiers hired by England during American Revolution to fight against coloniets; about half were from Hesse-Cassel and Hesse-Darmstadt, hence name battle of Trenton R-1280

Heatin, Greek goddess of hearth and home; Roman Vesta; V-464-5 daughter of Kronos and Rhea R-132

Hetch Hetchy Valley, California, a deen valley of the Sierra Nevada, in Yosemite National Park Y-341b reservoir and aqueduct for San Francisco A-283, S-42

Ifeteroauxin, aids plant growth P-306 Reterodyning, in radio R-38

Het'eropappus, a genus of asterlike plants of the composite family: perennial, low-growing, with azurcblue flowers; native to Japan and China; also called blue daisy.

Heuchern. Nec in Index Alumroot Henss (hois), Theodor (born 1884), German educator, author, and polit-German educator, author, and political leader, born Brackenhelm, Württemherg; book, Hitler's Wny', condemned by Nazis; after World War II, became chairman of Free Democratic party; elected first president of Federal Republic of Germany September 1919.

e'vea brasilien'sis, a rubber tree

R-237-8

He'vea

R-237-8

Herevy (hō'vō-shi), Georg von (born 1885), Hungarian chemist; with D. Coster discovered hafnium (1923); won 1943 Nobel prize in chemistry for use of isotopes in tracing chemical processes.

"He was not of an age, but for all time" S-120

Hewes, Agnes Danforth (born 1873?). Hewes, Agnes Danforth (born 1873?),
American author, born Syria; children's books are historical in setting ('A Boy of the Lost Crusade';
'Spice and the Devil's Cave';
'Glory of the Seas'; 'Codfish Musket', 'Spice Ho!'; 'A Hundred Bridges to Go').

Hewes, Joseph (1730-79), signer of Declaration of Indenendence; born Kingston, N.J.; delegate from North Carolina to Continence! Con-

North Carolina to Continental Congress

signature reproduced D-37

Hewins, Caroline Marin (1846-1926), librarian, born Roxbury, Mass.; from 1875 librarian, Hartford, Conn, Public Library; one of carliest leaders in development of children's libraries

Hew'itt, Abram S. (1822-1903), American capitalist and political leader: consistent advocate of good government; introduced into America open-hearth process of making steel; representative in Congress 1873-79, 1881-86; mayor of New York City 1886-90.

Mewitt, Peter Cooper (1861-1921), American inventor; son of Abram S. Hewitt and grandson of Peter Cooper, invented Cooper-Hewitt mercury vapor electric lamp and mercury vapor rectifier

Hew'lett, James Monroe (1868-1941). architect and mural painter, bern Lawrence, Long Island, NY.; de-signed Brooklyn Masonic Temple, Philadelphia War Memorial; murals in Carnegie Institute of Tcchnology, Pittsburgh, and Columbia University Cluh, New York Grooklyn Bridge, mural, picture

Brookiyn 4-390

Henlett, Maurice Henry (1861-1923), English romantie novelist ('The Forest Lovers', 'The Queen's Quair'; 'Open Country', time ranging from medieval to modern, scenes from leeland to Italy)

"The Life and Death of Richard Yea-and-Nay' R-150

Hexug'ound crystals M-262

Heanm'eter, in poetry P-335
Heane, in chemistry, See in Index
Paraffin series

Hexan'oda, the class of six-legged arthropods, or insects I-153

Heantench (hik'sa-tük), name given to the first six books of the Bible-Genesis, Exodus, Levitieus, Numbers, Deuteronomy, and Joshua.

nevinan, market town in n. England on Tyne River, 20 ml. w. of Newcastle; here Yorkists defeated Lancastrians in 1464; pop. 9715; gloves and coal: map B-324

Heyobarbital ("evipal"), an anestication of the state o

thetic A-246

Heydrich, Reinhard (1904-42), director, German Gestapo; "protector," Behemia, 1941-42; as assinated in Prague 1942: C-536

Heyerdahl, Thor (born 1914), Norweglan scientist and writer on travel and outdoor life; book 'Kon-Tiki' is story of his balsa-raft ex-pedition from Peru to well within Polynesia (4300 mi.) to prove his theory that Polynesian race is of American origin, not Asiatic; also wrote 'American Indians in the Pacific': E-456-7

Heyl, Paul Renno (born 1872), physicist, born Philadephia, Pa.; with U.S. Bureau of Standards 1920-42; invented, with Dr. L. J. Briggs, carth Induction compass with

measures earth's mass E-193

Heyse (hi'zū), Fnul (1830-1914), German poet, novellst, and short-story writer; Nobel prize winner, 1910; master of novelette ('Chil-dren of the World'; 'In Paradise').

Heyward, DaBose (1885-1940), writer and lecturer, born Charleston, S.C.; wrote of Negro life with understanding and realism ('Carolina Chansons', poems; 'Porgy', novel, later dramatized 'Mamba's Daughters', New March 1988, ters', novel).

Heyward, Thomas, Jr. (1746-1609). jurlst, born St. Luke's, S.C., a signer of Declaration of Independence: in Continental Congress 1775-78;

## laken prisoner by British in Pevolu

signature reproduce 1 D 37 rawoo a doing (1897 | 1930 | 1 Ling lish writer and entertal or at couris f Heary Vill at Mary I wrote court interludes which introduced personal characters rather than abstractions linkly g morality play with Luglish c nedy I The P age Called the I oure II

) also wrote epigram a ind pr verla

Heywood Thomas [lied 1641\*] Fing
lish dramatlat circued 1 has have willieb in whole ir latin is than 200 plus al ha lest a sapie don estle dran (AB hink like

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saved Judah See in India Ja kuon Ilelen 11 Kunt fliglenh

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Jacob John Grise (1861-1923) educator born leona III pred ident Princelon University Pres bierlan paylor Chamberd ura Pa 1887-01 taught ight and paylor dant 1912-2° author of broke en logic an philosophy

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bai H 352 353 B 77 bear B 85-8 88 H 352 bullerfiles and moths B 3870-d chipmunk C 287 dormanse D 125

dormanse D 125 earthworm D 197 pict re H 253 fiddler crab C 304 fish H 582 F 27 cel E 267 trop F 309 H 352 533 ground hog G 219 H 352 lnsecig 1 39 chinch but C 287, bee

B 99

prairie dog P 408 salamander S 25 snall and slug 5 204 snake 5 209 H 353 raitlesnake R 78

spiders S 345 6

lurile and loriofas T 223 H 353 librrnie (Al berni a) ancieni Latin and poelical nan e of Ireland

Hide weed a staneed pict at S 24 Hidework! (he do 30 she) Toyotimi Hibreniana Ancient Order of a fra lernal society of Roman Calholic

men of Irish birth or descent his men or irran term to the control of the lory based to 17th century or ear lier in Ireland American branch organized in he v York City in 1838 alded Irveh national movement pro sides sick benefits insurance and help for members

Hibtsess a large geous of berbs and shrubs of the mallow family of which are populatly called rose mallon most species have large showy flowers among the species cult valed in earders are the rose of Sharon (His saw a refle s) swamp rose utilon (Hibigs a More the for) and fi net of an h in (H bisc a Trionant fruit of okra

or gumbo (Hib sea) estalectus)

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Hickory Chair Asset B (Wild Bill) (1837 76) (roh) ereman born Troy (Prote Bl signeous & dricas on Sanis Fe and Oregon trails ( nion south the and ther Chal War fond lu na and ther Civil War fond of gambling and tamed as a dead

whol town may hal of Hays Cily fan 1989 f Abilena Kan 1881 killel man) libleses and utlawa murdered al Deodnood v D by Jack McCall Bukers A C city 4 ml as of pop 147a5 blokery

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filekoev elm a tree C 315 flicks Elward 1174n 1849) painter kn an (or Biblical allegoricat and h stor cal subjects both Bucks

County Pa also Quakec minister and sun pointer The feaceable Kingdom P 3ta color picture P 3f

color picture s of Hicks El as (1748-1930) minister of Society of Priends born Hemp wood I me Island strong ad of Society of Triends but a remp stead L ng Feland strong ad vocate of abol tion because of his liberal religious views Society bly ded for years into Otthodox and Elicks to Friends

and Highs to Friends

Highe Granville (horn 1901) author

born Exeter NH ed torial staff

New Hassel Madazine 1936-39

ediled letters of Lincoln Sleffens

(Greal Tradition One of Us

muli Town ) Mi kalle Friends Quakers Q 2 See place in Index Elicks Elian

Hidalgo (¿ dol ¿ö) Mexico state ta central part 8057 sq Ril pop 849 991 cap Pachuca miolag leal is manufacturers map M 195 Hideige y Costilia (è-dal go è ker té y:) Higeri (1753-1811) Mexi can patriol Priest L 113-14

leader of revolt M 208 idari (Aê da rê) Jisgorê ( 1634) Japanêse artist M 353 (1594-Hidari Hidates Indians or Minitari Indiaes

Hiddenite (Aid a it) a transparent green variety of spedumene used as a gent found in North Carolina Hile behind in folklore F 204
Hildre See in fader Furs and
for trade Leather

(1535-98) Japanese warrior and efafesman con of peasant became diciator of Japan as regent (1586) Illerarrhy [/ter art 1) a body of ecclesia vicel rulers especially ap-piled to Roman Cathole clergy from pope to lover clorgy Hirral le writing a runn ng form of

Hirral & writing a runn ng torm of Explian heroglyphic writing I 285 peture W 310a Ultroglypties (hi er ô af fix) pic ture writing H 585 W 310 picture W 310n 8ee also an Inder Ideo writing

W 310n See of 30 in Inder Ideo graphe will ng Picture writing Egyplian E 285-8 charf 4 177 pic 6 c W 310n Hayan B 144 pictures W 310u S 78 1 sella Stone L 285 8

Hieronymus Scc 1; [1/cz Jerome Sa ni Mid seand reproduction P 208
Hingles Fibured J (1884 1947) Pag
His balvation Army leader bore
Somersel Tecewed first commission born

Bih halvalion Army leader born Somerael received first commission at ane of 18 clered commission general 1973 resigned 1974. 10 clered to the community of the 10 clered to the community of the County Mayo Ireland stated U S in 1925 with Abber Theatre players for whom he was managine der for whom he was managine der for convidence of a right of Williams of the Arabit Folds of the Dark Breed

Butter Yeala (The Dark Braed Arable Holfings)

Bigglamon Renty Lee (1834 1939)
Lanker born Yew York City mejor in Civil War Joined Lee H gginson & Co Davion bankrya 1818 founded

Poston Samphony Orche ira 1881 gave Sold era T all and fit flarend Figglisan Thomas Wentworth (1875lasinam Thomas Mentworth (1879-1811) author and Civil Bar widder bora Cambridge Mars colonal of dryt regiment of freed slavas of Foung Folks History of the United Stales Cheertul Yeater

United States Cheerful Yeater days.)
High In weather forecasting W 81
High The strent in Oxford England
pictric 0 435
High-sli mins hrink D 304

High appellule court or auprema-court a main court in US C 500 High ball rs load term R 68 High Chard popular lerm for that group in Amickan and Polacopal churches, which alreases macra churches which alresses agera a antal ritual and holds to loctring

n antal ritual an i holds to loctring of apostolly succession. Filah Court of Jastire England C 501. Higher criticism applied to the Pible a detaird sludy of levia to deler make their dules authorship and other features.

Bigher education See in Index Col-loge University Brigh fidelity in sound reproduction P 208 High

igh frequency electric current R 40 1 om a magnelron D 321 diagram E 320 from

leansmitting It 42 Illah Crman language G 82 tilight ele s nams for the flicker Righten I fling one of Scotland a anl

maird asilonal Cances danced three or four persons so called br pleps as performer dinors siler malely on each leg picture S 53a

malety on each leg picture 5 854
Highland Perk 11, res drails! cily
on Lake Michigan 25 mi n of
Chicago poj 18 803 lavinis Perk
summer mus c cenier map 1 38
Highland lavin Mich sulomobile
manulaciuring cily surrounded by
Deiroll pop 46 303 miop, tanct

11 222 Righland Park Tex suburb of Dal-Jan pop 11 405 map inset T 90

u=Freoch u,German u gem go thin then n'=French nannt (Jean) sh=French f (e in avure), n = German gullurs) eh

Highlands, in New Jersey N-156 Highlands, the part of Scotland n. of the Grampians: S-63, 63c, maps B-321, S-63, pictures S-62, 64 clothing S-63a, picture S-63a

Highlands of the Hudson, range of hills in s.e. New York, intersected by the Hudson River H-438 High latitudes C-350 High Peak, or The Peak, in Derby-shire, England; 2086 ft.; at south-

snire, England; 2086 ft.; at southern end of Pennine chain.

Migh Point, N. C., city in n-central part of state, 14 ml s.w. of Greensboro; pop 39,973, furniture, hosiery, textiles, machinery plass paints; High Point College maps N-274, U-253 furniture market F 216-

furniture market F-319a High Point College, at High Point, N.C.; Methodist; founded liberal arts. 1924:

High priest, Jewish, religious head of Hebrews, especially in Palestine at the time of the Temple of Solomon; guardian of the sanctnary. Aaron was regarded as first high priest. In postexilie times important political

powers were exercised breastplate of J-346 breastplate of J-346 bright relief, or alto-relievo (āl'tō rī-16'rō), in sculpture S-74 High school E-242-3, S-58

biology laboratory, picture E-238 chemistry lahoratory, picture E-251

curriculum E-250-1 experiment E-251-2

core curriculum E-252: planning

committee, picture E-253 dictionaries R-88f, g distributive education V-50 V-502 gymnasium, picture E-252 income awards, chart E-239 junior high school E-256 libraries L-195 objectives E-251

safety education S-4, picture E-244 "High-school" horses H-428h, picture H-428d

High seas, ocean waters not included within the jurisdiction or bounda-ries of any nation.

High-speed tool alloys A-172-3, T-206, 31-335

High-tension electric current, current under pressure of thousands of volts, picture E-923 power lines use E-312b

transformers T-167, E-305 X-ray tubes X-331-2 High wave, table R-30

Highway post office P-384-5

Highways. See in Index Roads and

streets

High-wing plane. See in Index Aviation, table of terms

Hitman (hē'n-mā), or Dagō (dā'nā), Island of E-tonia, in Baltie Sea, n. of Saare Island; 572 sq. mi.; farming, fiching; settled by Teutonic Knights in 1200; taken by Sweden 1563, hy Russia 1721; occupied by Germany 1917; aven to Estonia 1918; leased by Estonia to U.S.S.R. for military base 1939; maps E-417, R-266

Hiking, camper's rules C-63

Hiking, camper's rules C-63

Hilda, or Hild, Salnt (614-6°0), English abbess, princess of Northum-bria; founded monastery of Whitby, in N. Yorkshire; feast day November 17.

Hildebrand. See in Index Gregory VIL.

Hildebrand Hildebrand (hil'de-brant), Adolf von (1847-1921), German sculptor; combined naturalism with classic combined naturalism with Cassie forms; famous for youthful male figures and portrait busts ("The Problem of Form): S-80
Hildeshelm (hil'des-him), Germany,

town 21 mi. s.e. of Hanover; fine examples of late Gothic and Roman-

esque architecture; pop. 72,292; seat of bishoprie, prominent in Middle Ages: map E-424

ill, Ambrose Powell (1825-65), soldier born Culpeper County, Va; served in Mexican and Seminole min. wars: lieutenant general in Confederate army: led division during Seven Days, 2d Bull Run, Antietam, and Fredericksburg battles: wounded at Chancellorsville; made com-mander of corps of Lee's army, which he led at Gettyshurg and in Wilderness Campaign; killed at Petersburg

Gettysburg G-105 Harners Ferry C-335

Hill, Daniel Harrey (1621-69), soldier and educator born York District, S.C.; served in Mexican War; at-talned rank of lieutenant general In Confederate arm), conspicuous at Malvern Hill. South Mountain, Antietam, and Fredericksburg

Hill, David Jayne (1-50-1632), diplo-mat and historian born Piainfield N.J: assistant secretary of state 1992-1903, minister to Switzerland and Holland ambassador to Germany ('History of Diplomacy in the International Development of Europe')

Hill, Mrs. Eben Clayton. See in Index Bailey, Carolyn Sherwin

Hiil, Edward Burlingame (born 1872), composer and teacher born Cambridge, Mass, in music department at Harvard University 1902-40 40 when he retired co songs, sonatas chamber composed musie. symphonics

Hili, Jnmes Jerome (1835-1916), American railroad magnate H-355 fight for control of Northern Pacific

memorial library S-24

Hill, Sir Rowland (1795-1879), Eng-lish administrator, author of uni-form "penny" postal system P-387, S-366

Hili, formed by erosion E-181

Hillary, Sir Edmand P(creivat) (born 1919), British heekeeper and moun-tain elimber, born New Zealand; with Tensing Norkay won honor of being first men to reach summit of Mount Everest, climbed May 29, 1953, on British expedition led by Col. H. C. J. Hunt.

Hillbilly, an American colloquialism meaning a backwoodsman or a mountaincer, especially of s. United States.

Hillel (76? B.C.-A.D. 10?), Jewish rahbi, born Babylonia; president of the Sanhedrin in Jerusalem; noted for humility, gentleness, true piety.

Hiller, Ferdinand (1811-83), German planist, conductor, and composer, born Frankfort-on-Main; established Cologne Conservatory; exerted influence as teacher and conductor.

Hiller (real name Hüller), Johann Adam (1728-1804), German com-poser and author, born Görlitz;

poser and author, born Gorlitz; founded singing school 1771
German Singspiel O-396
Hillis, Newell Dwight (1658–1929), clergyman and author, born Magnolia, Iowa; Plymouth Congregational Church, Brooklyn 1699–1924 (Building a Working Faith'; Studies of the Greet War) 'Studies of the Great War').

Hillman, Sidney (1887-1946), American labor leader, born Lithuania: president Amalgamated Clothing Workers of America; director of labor division of Office of Produc-Management ction Board) (later Production 1941-42; appointed adviser on labor matters to President Rooscveit 1942; ehair-man of PAC (Political Action Com-

man of PAC (Political Action Com-mittee) 1943-46: picture R-214
Hillquit, Morris (1869-1933), Amer-ican lawyer and Socialist leader, born Latvia ('History of Socialism in the U.S'; 'Socialism Summed Up'; 'From Marx to Lenin').
Hillsdnie Coliege, at Hillsdale, Mich.; founded 1844; arts and sciences.

founded 1844; arts and sciences, music, home economics, husiness,

nursery school.

Hillside, N. J., township between Newark; and Elizabeth, pop. 21,907; steel, iron, and wood products, toller and the second states. preparations map, toilet N-164

Hillyer, Robert S. (born 1895), poet Lorn East Orange, N. J; in English Dept at Harvard University 1919-26, 192x-45 at Trinity College 1926and at University of Delaware after 1952. Puitzer prize (1934); author of symbolicai novel 'Riverauthor of symbolical novel 'Riverhead', verse in classic tradition,
disciplined and thoughtful ('Collected Verse', A Letter to Robert
Frost and Others').
Hilo (hi'io), Hawaiian Islands, port
on n c coast of Hawaii; pop. 27,198;
H-288, mans H-286, P-17

anchorage H-264

Hilton, James (1900-1954), English novelist, born Leigh, Lancashire, England In Good-hye, Mr. Chips', he pictured his schoolmaster father: employed unusual locale and char-acterization ('Lost Horizon'; With-out Armor', 'Random Harvest'; 'So Well Remembered'; 'Time and Time Again')

Himselad Pradesh (hi-mā'chal pra-dāsh'), state in n.w. India, in w. Himalayas; area 10,451 sq. ml.; pop. 953,367; eap. Simla; formed hy merging some of former princely states of Punjah States with most of former princely states of Punjab Hill States; consists of two parts, separated by Punjab state: map I-68a

Himalayan bear B-88

Himalayas (hi-mā'la-yaz), also Himallimaia) as (hi-ma'(a-Jaz), also Himalaya, the loftiest mountain system on earth, between India and Tibet; 1500 ml. long; highest point 29.028 ft.: H-355-6, maps A-406-7, 411, I-54, C-259, picture H-356 Mt. Everest E-450, picture A-409 plant life I-55

Himation (hi-mat'i-on), Greek garment D-144, picture D-145

Himmler, Heinrich (1900-1915), officer and political leader, horn Munich Germany; joined National Socialist party 1919; deputy leader 1927 and Relehs leader of Schutzstaffel (S.S) 1929; chief of Gestapo and carried out "purge" 1934; minister of inout "purge" 1934; minister of in-terior and chief of Reich adminis-tration, also head of People's Army; killied self when captured by British: G-99, picture W-250 Hinald, suburb of Baghdad, Iraq

B-16

Hinchs, Sir Francis (1807-85), Canadian journalist, financier, and statesman, born Ireland; prime minister 1851-54; governor of Bar-bados 1853-62, of British Guiana 1862-69; conspicuous leader in fight for responsible government; notable work as minister of finance; pro-moted reciprocity with the United States.

Hind, a female deer.

Hindemith (hin'de-mit), Paul (born 1895), American composer, born Hanau, Germany (became U.S. citzen 1946); head of music department, Yale University, from 1942; compositions extremely modern in

style of eran chamber and social music author of & C mpowers Ti orte Hin deaburg Pani von (1847-1934) German general 11 356-7 pectures H 384 G 99

chief commander W \*28 president of German 1 98 Ruesian front (1914) % 221

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Jans J 326 bathing at

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Hinda Nauh (An Ag kinh) a range
of mountains in central As a w of
Himmalayas highest point Trach
Bits 35 400 ft A 410, maps I 54
A 33 A 406
A fighant tan A 31

Rindu lilerature I 66

Rindus Maurice Gerselon (born 1891) writer born Bolshoya born Bolshoys came to US In 1891) writer born Eulehous Blkovo Russ a came to US is 1905 revisited Pussia many limes Ejkov. 1905 revisited Pussia sulling 1912 began free lance writing 1912 Russian Peasani and Fevelu-Cotas To Sing

tion Moscow Skies To Sin Crisis in the Pussia and Japan Kremin ) Hisdasian Perejan name for India, meaning land of the Histor used for land n of Vindhya Sile or upper hasin of the Garges 5 53

Hindustant & modern vernacular of the indo Aryan group of the Indo Furopean family of languages

Hines Dunesn (born 1880) author and publisher of guides for text elers boin Bowling Green Ky books frequently revised (Adlen

lurra in G od Fating Lodging for a vight Vaccil u (ulle) Mass John Lennard (Dorn 1869) Army officer born White Sulphur Army onicet some winner Suppose Springs W Va seriel in Spanish American War in Philippines and in World Wir I made major seneral 1921 rhoef of stay of U S. Army 1924-76 commander Philippint Department 1830 commander of

tired from active errice May 1932
Maged oystee shell (spon (gits crust
year t s) molluck shell (7 pacters S 139 below Kilbarine Tyana Hinkson. india Typen Fatherine

Rinnom Valley of or Cehenna in Pale-time near Jetu-alem I 335 Iffany a hybrid animal the offspring of a male horse and a female are

11 4224 H 42kk Haierland the 1md behind coupling hellements which is dependent on them fritnden 19th century Cermany a earn to jurisdiction wer such interior lands led to the hapid partition of Africa among the Rinterland the

Curopean powers Mingo Rabe Japan Stels Indee hobe

HIp of rose P 232 Hip roof "ir in Index Achitecture lable of terms Ripparehus th por kus) (died 514 ac) tyrani of Albens G 166

Hipparches 12d century BC | Greek Avirenomer and malhematician

tounder of trapmometry discovered precess no de ou nozes and instented methol of fixing terrestrial positives by circles of l'alliade and longitude thus fond nar see ning geomaphy A 43 L 31 S 65 Filippins idual discount of the circle of l'albentan lyrant C 188

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Hippocrates (hi pôl sa tê 1 (460% 377° B.C.) famous Greek physic an 64603ailed father of med eme to dissor ale med (inc from super etiti n and to in et on extentino

study of drease M 1645 Hippocrate dath on eath presumably written by Hipp crates which has been an eth cal guide of the medical pt fession since the time of H p po rates 31 164b it is se follows I swear by Analis the I cwe at hy Apollo she physician by Apollopius Hogelt and Pana

ny Alsouripids Hogert and Pana cas and I take to witness oil the gods all the goddesses to keep according to my ability and my judgment the fello lang Gilb To consider dear to me as my cassed, him who taught. To consider dear t the as my parents him who trught the the art to ine in common with him and if necessary to share my goods

will hem to look upon his chi as my our brothers to teach them this art if they so desire with us fre or written promise to import to my a ne and the sons of the master who taught the and the disciples who have enrolled them arbes and have agreed to the rules of the profession but to these alone of the profession that to these alone the precepts and the Instruction I will prescribe regime for the good of my patients according to my ability and my judgment and never do harm to supre. To please no one will I preverbe a deadly drug our at a darder which may caree his death. Nor will I may cause his death of will I go as somming a person to procure abortum. But I will preserve the purity of my life and my art. 6 will not cut for stone even for parents in whom the discass manifest I will leave this operation.

figures even the sail) an every huse where I come i will enter only for the good of my pallents keeping myse t far front all in tenlional II doing and all seduction and especially from the pleasures of feve with won en or with men be they tree or laves n by come to my knowledge in the All that exerci e f my profess on or outside exercic this process on a daily con-merce with men who now not la be strest thread 1 will keep la he streit abrad 1 w ll beet se rel ant al liever reveal 1 k krep the sub Latthfully may; eat a my llf and praise my art respecied by all mrn and in al filmed but it averve from it or s olair it may the reveree be my

is be performed by practitioners (special ste in this art). In every

Rippoerene (k po kron) spr ng ea-crel lo Muses P 111 Hippodrams (7 po drom) word from Greek meaning course for horse or chariot recing most fam us an c eni hippodromes were at Olymp a

ter suppl ed to large indoor amuen muchi piaces as those in London and her York circus during Justin an a time B 674 Hippolyis queen f the Amazons in lareek, 1 ylbo ogy wore fumous

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Rippin (hrrp, nu) ancient Samnlie

tribe of a Raly revolted from Rmas conquerors and John Car

thaghnans in 2d Punic War ob

signed Forms franchise etter final

defeat of Samnlies by Sulta 85 sc mirsch Fmil C (1852-1923) Amerl can rabbl born Luxemburg minister Sleal Congregation Chicago

after 1880 professor rabbinkal Reraturs and philosophy Univer sily of Chicago after 1892 leader advanced Judalem and philan rabbinical Ihrops Hitesch Maurice baron de (1831-96)

il=French u German u gem fo thin then n=French naval (Jean) nh=French f (x in avers) x=German gujjursi eh

Austrian financier and philanthro-pist; devoted millions to Jewish education, colonization, and charity in various countries.

hirsch, Stefon (born 1899), American painter, born Nuremberg, Ger-many; first work cubistic and ab-stract; later work characterized by simple, direct composition intensi-fied by clear-eut lines and curves; favorite subjects town and city

Blrundinldae (hir-un-din'i-de), suallow family of birds; includes purple martin, cliff swallow, barn swallow, tree swallow, bank swallow, violet-green swallow

Hising, or von Hisinger (his'iu-ger)
Wilhelm (1766-1852), Swedish
chemist, codiscoverer with Berze-Swedish

lius of cerium.

Hispanin (hís-pā'ni-a), Roman name for Spanish peninsula.

Hispanic Society of America, society to promote the study of Spanish and Portuguese languages, literature, and art, founded in New York City in 1904; membership honorary and restricted to 100 scholars of any nationality; maintains a reference library of about 100,000 volumes and an art museum which contains

and an art museum which contains finest Hiepanic collection in US Hiepanicla (his-pān-yō'la), island of West Indies; contains Hauti and Dominican Republic: H-244, 245, D-123, maps N-251, W-96-96a Cortez in C-488 Las Casas' work for Indian L-105

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during Moorish era in Spain P-396a Hissarilk (hi-sār'ilk), place in n.w. Turkey; site of ancient Troy: T-191 Schliemann's excavations S-57, T-191

Histadrut, Jewish labor federation of Palestine, founded 1920; comprises not only trade unions and co-operatives, but also social and cultural agencies; designed to create a labor commonwealth P-46-7
Histamine (his tamen), an amine present in all vegetable and animal

tissnes

tissues in allergic reaction A-170
Histogram, a chart, G-163, S-385d, chort G-163, graph S-385d
Histology, science of the tissues of animals and plants, also the microscopic study of the tissues A-239,

'Historia Regom Britooniae' (his-tő'-rí-a rê'ġŭm brī-tăn'i-ē) (History of the Kings of Britain), by Geoffrey of Monmouth A-394

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'History of Goody Two-Shoes, The', a children's story supposed to have been written by Oliver Goldsmith L-270

Hit, Iraq, ancient town on w bank of Euphrates about 90 ml nw of Baghdad pop about 8000 asphalt deposits in vicinity maps A-285, 1 - 224

Hit, in baseball B-65

Hitch, temporary rope fastening K-81 Hitchcock, Gilbert Monell (1659-1934), American new spaper pubhister and Democratic political leader founded Omaha World Herald US senator 1911-23 as charman of senate foreign relations committee upported Versailles Trenty and League of Nations tions

Altchcock chair F-320

Hite. Jost (died 1760), American colonizer born Strasbourg Alsaee, emigrated because of religious perfounded settlements secution. New York, Pennsylvania, and Virginia

gina
Hitler, Adolf (1880-1913) chancellor
and dictator of Germany H-383-5,
G-98-100, R-291, W-244, pictures
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H-385-6 Hittorf (hit'orf). Johann physicist: Willelm and X rays.

Hitty, children's story by Raschel Lyman Field L-216b, picture L-269 Him Oa (h¢'vä ö'a), a Pacific island; largest of the conthern Marquesas

pop. 836 map P-17 Hivltes (hivits), in Old Testament, one of the Canaanite peoples who inhabited Palestine before the ar-

rival of the Israelites.

Clubs, clubs organized among high school boys and affiliated with Young Men's Christian Assoclation, with purpose "to create, maintain, and extend throughout the school and community, high standards of Christian character." standards of Christian character."
Bible study and various other activities are carried on The name
Hi-Y Club was first used in 1914
citizenship program, picture C-320
Hjelm (hyrlm), Peter Jacob (1746—1812), Swedish chemist who iso-

lated molybdenum.

hated molybdenum.

Hjelmar also Hjalmar (yēl'mār), lake
In Sweden, about 40 mi. w. of
Stockholm; connected with Lake
Malar both naturally
cially; area 185 sq. ml.
Hoang Ho, river in China. See in
Index Hwang Ho
Hoar, George Frisbie (1826—1904)

Hoar, George Frisbie (1826-1904), statesman born Concord, Mass.;

"Free Soller" and anti-imperialist; representative and senator from Massachusetts 1869-1901 ('Autoblography of Seventy Years').
Heare, Spiniel, Viscount Templemond

(born 1880), British statesman; en-(born 1879), Drift's restrement to the depth of the far line of 1971-35; foreign sceretary under Baldwin 1935, forced to resign by criticism of Hoare-Laval plan for dismemberment of Ethiopla; home to the far the far 1972-10; ampassador to sceretary 1937-10; ambassador to Spain 19 to-11.

Hoarfrest F-303 Hoarfrest See in Index Horehound Honry alder, See in Index Speckled alder

Hontrin (hō-āt'sin), a South Amerlean bird, pictures B-157
Hohm, Jomes (1762?-1831), architect,

designer of White House W-122

Ho'bart, Alice Tisdale (born 1882) novelist, born Lockport, N.Y.; in China 16 years ('Oil for the Lamps of China'; 'The Peacock Sheds His Tail': 'The Cieft Rock'; 'The Serpent-wreathed Staff).

Hobart, Garret Augustus (1844-99), Republican party leader, born Long Branch, NJ.

vice-president of U.S. See in Index

Vice-president, table Hobart, Ind., city 7 ml. se. of Gary; pop 10,241; map I-78

Hobart, capital and largest city of Tasmanla, on a coast, 12 ml, above mouth of Derwent River; pop. 76,-567; University of Tasmania: T-22, map A-189

pontoon bridge. See in Index Bridge. table

Hohart College, at Geneva, N. Y; Episcopalian; for men (co-ordinate with William Smith College for women); founded 1842; arts and

science; graduate studies obbrma (hob'e-ma), Veinder (162s-1709), Dutch landscape painter, influenced by Van Ituisdael Hobbrma ('Avenue, Middelharnis'; 'Entrance to n Village').

Hobbes, John Oliver, pen name of Pearl Mary Teresa Craigle (1967-1906), English novelist and drama-tist born Boston, Mass; vivid style. name of sparkling with epigrams and caus-tic humor (Some Emotions and a

Moral'; The Ambassador'), obbes, Thomas (1588-1679), Eng-llsh philosopher; famous for Stetem of political and ethical philosophy; called "father of empirical psychology"; most noted work The Leviathan', treatise on philosophy of revenues. P. 350

of government: P-360 Hobblebush. See in Index Wayfaring trce

Hobbs, N. M., city in extreme se; pop 13,875; petroleum industry; nunps N-179, U-252

Hobby, Oveta Culp (born 1905), government official and publisher, born Kilicen, Tex.; parliamentarian Texas House of Representatives 1925-21, 1939-41; joined The Hors-ton Design 1931 1935-31, 1939-41; Joined The Horston Post as research editor 1931, became executive vice-president 1938, publisher 1952; first director Women's Army Auxiliary Corps 1942-45; U.S. secretary of health education and walfare 1953-55; and welfare 1953-55: education. picture H-375

Hobby, an activity outside his work in which a person is especially inferested H-387-401, pictures H-387-90, 392, 394, 397-401 books H-388-401, I-148, L-207-17, N-685-0

N-680-9

Hoblouse, L. T. (1864–1929), English sociologist S-222

Itoffmann Tales of opera by Jacques

9°) German chemist who he ped to found German coal far in lustry

d scovered benzel in coal jar (1842)

nran h stor cal and portrail painter popular for ideal conceptions of life

of Christ also for paint net from

Rofmann Hrinrtrh (1824 1911) Ger

Offenbach Stry 0 308 Meffmann von Falleraleben See in In der Huffmann August Helnrich Hofmann August Withelm con (1818-

myth logy

Hobkirk a Hill battle of British de-feated Americans under Greene 1781 n of Camden S.C. also called 2d battle of Camden

e hoken h J port of entry railroad and industrial center opposits New Re hoken NJ

and industrial conier capes is New 1-rik City on liuds in 1 crit City on liuds in 5 cs. rich capes 50 d.6 ler ilgus f several med con ship of technology iii re 1 led in 1 cs. rich capes on 1 cs. rich capes in 1 cs. rich capes for Gentler in a Agreement noted for Gentler in a Agreement noted of protest against unit Semution also wrote The Other Father and The Celeirity not el

Holison obson Birhmond Pearson (1976).
1937) Nav hero born Greens) rn
Ala gradunie i I 9 Na A ad
emy in punh therian Wis
kunk iollier Herri nr in attempt Birhmond Pearson /1978to clove Santisgo harl ? n charge of various neigh constructions memi er of Conure s from Alabama 1907 15

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horse hearest the door.

In stellag Albah by 91 Caneda early Indian willast at mouth of ot taxas Pives 130

If y Chi Minis (10 Als 1114) (born 1801) (11 Albah 1801) (born 180

1 125 6
Hothkirch (high hirt) Germany sill lage 35 ml ne of Drasden whete Austrians defeated Pruesians under Freder ric the Great 1754 fSeven Years, War. Hochstadt (Abx shiel) on the Danube Garmany town in Bavaria 60 ml n w of Munich battle of Elenheim 1"94

Hock or herk joint dog just re D 110b horse priure H 423a Hockey H 402 picture H 402

Herkling Bluer & atteam in se Chio flowing into the Ohio River about 100 thi long 1149 U 357

100 thi 100s 11ap U 30c Hoc signor vince (In this egn con-quer) C 456 Redax in tolkings F 204 Hodelda, (In dd t da') for fied sea port of Yemen Arabia on Red Sea pop 26 000 center of Coffee trade

Ho der in Norse mylhology blind god who slew Battler D 20
Ito taenyttie Kv lown 4, ml n of
Loulville pop 1695 L 246 map

K 30 Abraham Lincoln National II stori ral Lark N 30 map N 18 picture h 34

Hedges Courless H (born 1887) US Army officer born Petry Ga (rom privale in US Army (1909) ad vanced through ranks to four vanced through ranks to four viar general [1944] commanded American isl Army in World War

II retired 1949 George (1856-1918) Episco Hodges pal clergyman and author born Rome N Y at Calvary Church Pittsburgh 1881 94 dean Epicco pal Theological School Cambridge Mass 1894 total death (The Ha nan Naiure of the Saints Every mans Religion) Iodanne Raiph (Born 1871) English

are powerful and direct ( The Last Blackbird and Other Lines Lye and Other Poems ) Itodier (lodlr) kerdinant (18 3

liodier (I od I v.) kerdinant (18 3-1918) buiss palitier and lithog rapher leader among Surys med arm signorus almpite in land scapes figures portraits liddines tas riely (fold me 22 ve stor h I yr) agri u tural town in ee Huggery Is mi na of Seeged pop 59 ist mas E 425 Roc Richard Warch (1812-86) manu

factures and inventor a ra York City with his brothers Pater S and Pobert made many contribu-P 414d

Reetake form of corn bread P 263 Rock vit Balland Sec 18 Index Hook of Holland

Heet it (I unit) in Korse my thology
rod who with Odm and Loki
created first man Ask and first
woman Emb a fir m trees in filld or Holland gar | from Gain they obtained life

from Hoenir mind and from Loki he senses mar and N 232 P imar and N 252 Het bark pa ace in Vienna V 471 472 He fer Andreas (1767 1810) Tyro he s pair of and hero feadri f it TUITECISON tent 34 Bavaria beliased court martialed and eh ? 7 2328 leftr Karl (1978 1955) German artist some worle are in Flemish

iradition others "uggest ve of Cf same or Pirasso and still others abs raci and expressionistic favo rite subjects circus its nudes por trails still life and interiors of Jacobon ffendeleus tant

Matre

Refuing they ding; Harafd (1842-1931) Dan sh philosopher i History of Modern Philosophy Philosophy of Religion) Sami el Boffen stein (1890-1947) American jeet and mol on picture writer born Lithuania wrote light series (Poems in Praine of Prac-tically both ng.)

tically Nothing?
Refman chaeles Evane (1906-34)
newspaper and maratine editor
novel six, poel born New Tork City
(A Winter in Ue West, Greyn,
Jaer a Ronance of the Moha Vi,
Rofman Ernel Heeden Amelies
(1776-18-22) German novel et and

comboner leader in ron ant move ment best known lot grue one tales of the supernatural f The tales of tha : Hoffman Josef Franc 31 (horn 1870) Viennese modernial architect forms Josef Franc II (horn 1870) Vienness modernisi architect structural austarity releved by surface decorative patierus and rich color noted chiefly for precuely properi one i industrial buildings

properi one i industrial buildings
Heffmen Marlina (Hrs Samuel B
Grimson) (born 1887; sculpice
b rn New York City auchor
Heads and Tales an autob a
raphy (parts) is of Padersaski
Paviova groups and single figures
Illustrating rac at byes for Chi
caso Natural History Museum)
sculpings part rea (100)

Heffrenn I aut Geny (born 18911 busi leffrena I auk Gray fborn fg911 burst ness exetutive nad public official born Chicago III president 810 debiker Carporation 1953-66 be-words Divelopment 1955-66 be-words Divelopment 1955 bad of Econem 6 Cooperation Adm s-ra-sero 19548 50 president of Ford Foundation 1956-51 board tase-man of Studebaker Corporation Corporation 1956-65 board taseChr el m the Temple pict re J 232 Hafmann Josef [born 1878] Ameri can plan si and composer born

can plan si and composer born Cracow Polani an infani producy at six surcessful con ert i ur of Europe al nine d rector Curius In-stitute of Blusic Philadelphia 1975 35 rompositions for plano and orchestra Holmannettal (16f mone til) Itugo ion (1874-1920) Austrian neo ion (1878-1920) Austrian neo-romanile dramat si and pret desit chefly with imaginatus word (The Death of Illian one of his best plays Diekira and The Posa Cava ier used as i brelli for operas

by Richard Straues! The Rose Caval et glory O 393 Methodier Billein (1844 77) Gar man bolanisi born Leipzig de actibed fertilization and embryo formation in plants discovered attenut on of generalicas in life

eycle of ferns moster and other CT) Dingame. Nofelia College at Hampalead L I NY founded 193, granted abso luis charter 1950 arts and a never usiness adm nieralion aducali n

Bosiners and nietration squeati t Helif (16 /of) city in Arabia 4 mi from Perran Gulf pon 100 000 mops A 285 A f08 Hes a domesticale 1 mammal of the swine family H 402-5 pictures H 403-4

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vaccines inoculating picture V 433c

Bo can Ben (born 1912) professional golfer born Siephenville Tex in 1948 became first golfer to win the following tournaments in one sea son Professional Golfers Asso-ciation US Open Western Open

Hugan house of Navajo Ind and I 104c

Hogaril Wittiam (1697-1764) Eng lish painter and engraver If 405, P-285

'The Graham Children' P-29d, color picture P-29c

works, pictures E-369a-b, H-405

Hogbacks, in geology R-176 Hogben, Lancelot (born 1895), English zoologist and writer, professor of natural history at Aberdeen University 1937-41, of zoology Birmingham University after 1942; stressed practical and social sig-nificance of science in 'Mathematles for the Millions' and 'Science

for the Citizen'. Hog cholera, an infectious bacterial

disease afflicting swine; causes diphtheritic condition of intestine loss from and control H-404 Hoge (hôā), William Morris (born 1894), U. S. Army officer and clvill agricust horn Requirity No.: In ngineer, born Boonville, Mo; in World Wars I and II; commanding general in charge of construction of Alaska Highway 1942; became 4-star general 1953; commanding general U.S. Army in Europe 1953-. Hogfish, Spanish. Sec in Index Span-

ish hogfish Hogs, James (1770-1835), the "Ettrick Shepherd," Scottish peasant poet ('Scottish Pastorals'; "The Mountain Bard'; "The Queen's Wake'; Pilgrims of the Sun'; "The Poetle Mirror').

Hogging down, in corn harvesting C-484

Hog Island, partly in Delaware Co., Pa., and partly in s. Philadelphia, Pa.; municipal airport World War I shipyard W-236, pic-lure W-234

Hogmanay Day F-59 Hog-nosed snake S-209

Hog seore, in curling C-530
Hog seed, a unit of liquid measure,
table W-87

Hogue, La, battle of. See in Index La Hogue

Hogweed. See in Index Ragweed Hogweed. See in Index Ragweed Hohenfieldeberg (hō-cu-rhē'du-berg), Poland, former German town in Silesia, 36 ml. s.w. of Breslau; victory of Frederick the Great over Austrians and Saxons 1745 in War for the Computation of of Austrian Succession; included in Poland since 1945.

Hohenhelm, Theophrastus Bombustus von. See in Index Paracelsus Hohenlinden (hō-ēn-lin'din), Ger-many, village in Upper Bavaria, 19 mi. e. of Munich; French victory over Austrians in 1800.

Hobenstaufen (hô'en-shtou-fen) noble German family of the Middle Ages H-406, F-281, 282. For list of Hohenstaufen emperors, see in Index Holy Roman Empire, table Ghibellines G-222d

Hohenzollern (hő'én-tsől-érn), a noble German family H-406. For list of Hohenzollern kings, see in Index

Prussia, table growth of power P-424-424a overthrow W-136

Hohenzollern, former district of Prussia; 441 sq. mi.; 1950 pop. 85,863; after World War II became part of Württemberg-Hohenzollern: H-406 Hohe Tanern (ho'e tou'ern), range of

Eastern Alps; also, a summit (8080 ft.) in this range: T-232b

Hohokam culture, of prehistoric North American Indians I-109, picture

Hokkaido (hō-kī'dō), or Hokushu, northernmost large island of Japan: 30,328 sq. mi.; pop. 4,295,567: maps J-297, A-406

Ainu men, picture J-298 climate J-296

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Hokku, Japanese poetry form J-312 Hokusai (hō-ku-sī) Katsusliuka (kā-

tsu-shē-kāi (1760-1849), Japanese artist, born Yedo, Japan J-317, D-140d

print J-314, color picture J-315 Holbein (höl'bin). Hans, the Elder (1460–1524), German painter, best known for The Basilica of St. Rnown for The Bashiea of St. Paul' and a 'Passion' in 11 scenes; his later work shows Italian in-fluence grafted on the Flemish of his youth.

Holbeln, Hnns, the Younger (1497-1543) German painter son of Hans the Elder H-406, P-29b 'Anne of Cleves' P-27b, color picture

P-27b

mural, picture M-238b portrait of Erasmus, picture R-106 portrait of Nicholas Kratzer, picture H-406

wood engraving E-386

Holberg (hol-borg'), Ludelg, Baron (1684-1754), Norwegian-Danieh dramatist, historian, and philoso-pher, called the Molière of the North; made Danish a literary lan-North; made Danish a Merary tan-guage, had vast influence over his countrymen ('Subterranean Jour-ney of Niels Kilm'; 'Counciles'). Holborn (hō'hònn), England, metro-politan borough in central part of London; pop. 24,806; contains Lin-coin's Inn and Gray's Inn

coin's Inn and Gray's Inn
Holbrook, Josiah (1788-1854), educational reformer, born Derby,
Conn, founded American Lyceum;
tried unsuccessfully to found "Lyceum City" at Berea, Ohio: C-205
HOLC (Home Owners' Loan Corporation), U.S. R-205

tion), U.S. R-205
Holcomb, Thomas (born 1879), U.S.
Marine officer, born New Castle,
Del.; in World War I; commandant of Marine Corps Schools,
Quantico, Va., 1935-36; commandant U.S. Marine Corps 1936-43;
U.S. minister to Union of South
Africa 1941-48; retired 1948.
Hold. See in Index Nautical terms

Hold. See in Index Nautical terms, table

Holden, Edward Singleton olden. Edward Singleton (1846– 1914), astronomer, born St. Louis, Mo.; president of University of Cal-Ifornia 1885-88; did most important work as director of Lick Observa-tory, Calli., 1888-98; librarlan of U.S. Military Academy, West Point, after 1901.

Holding company, a company which owns securities of one or more other companies and is thus in a position to control their management M-360 Holds, in wrestling, pictures W-305-6 Hole-in-one, in golf G-136 Holdidays H-407. See also in Index Festivals and holldays

Hollashed (hā/inz-hēd or hā/in-shid), or Hollingshead, Raphael (died 1580), English chronicler, compiler of 'Chronicles of England, Scotland and Ireland', now valued because it was a source book for the Elizabethan dramatists Shakespeare's debt to S-124

Hol'land, Chiford M. (1883-1924), engineer, born Somerset, Mass, authority on underwater tunnels; assistant engineer in building East assistant engineer in building East River tunnels, 1996-7; chief engineer of vehlcular tunnel under Hudson River between New York and New Jersey, completed and named for him after his death.

Holland, John Philip (1840-1914), American inventor, born Ireland submarine development S-437, P-97 Rolland, Josiah Gilbert (1819-81).

submarine development 5-33, F-34 Holland, Josiah Gilbert (1819-81), editor and author, born Beicher-town, Mass. ('Bittersweet'; 'Seven-oaks'). Holland, Mich., port and manufactur-ing city at head of Black Lake, 25

ml. s.w. of Grand Rapids; pop. 15,-858; grain market, leather, woodenware, furniture, flour, beet Sugar; Hope College, Western Theological Senilnary: map M-227 tulip festival, pictures C-354, M-218 Holland, North and South, chief prov-inces of the Netherlands H-427

inees of the Netherlands H-407. See also in Index Netherlands

Holland, Parts of, administrative dis-trict in Lincoln County, England: map E-347

Holland cloth, a cotton or linen cloth, usually glazed or heavily sized; used for window shades.

Hollandia, administrative center for Dutch New Guinea, on n. e. coast: maps E-203, P-16 World War II W-268 Holland Tunnel, New York City T-209,

N-224, map B-329, picture N-223 Hol'les, Denzil Holles, Baron (1599-1660), English parliamentary loador active in opposing Stuart tyran-ny; imprisoned 1629 for anticrown demonstration in the Commons, he denied court's jurisdiction over acts committed in Parliament; helped Pym draw up Grand Remon-Pym draw up Grand Remonstrance; active in Civil War but opposed Cromwell and army policy.

Holley, Marletta (1850-1926), author, born Jefferson County, N. Y.; wrote amusing stories concerning 'Sa-mantha', and 'Josiah Allen's Wife'. Holling, Holling Claney (born 1900). Illustrator and author of children's

books; grew up on Michigan farm; books; grew up on Michigan farm; worked as scientist with Field Museum of Natural History; in his 'Book of Indians' and 'Book of Cowboys', his wife, Lucille Webster Holling, helped with the illustrations ('Paddle-to-the-Sca'; 'Seabird', 'Minn of the Mississippi').

Hollingshead, Raphael. See in Index Holinshed

Hollius College, at Hollins College, Va.; founded 1842; for women; arts and sciences.

Hollow gravity dum D-10, diagrams D-8, pictures D-8
Hollow grinding, grinding a razor or other cutting tool with a slightly concave surface on each side of the cutting edgo to enhance cutting power.

Holly, evergreen or deciduous trees or shrubs H-407

Christmas eustoms, origin C-294a

used for yerba mate T-32
Holly family, or Aquifoliaeae (āk-wifō-li-ā'si-ē), a family of trees and
shrubs, native chiefly to Western
Hemisphere, including holly, yaupon, black alder, winterberry, and Hex paraguariensis, the source of yerba maté.

Holly lock, a garden plant H-407 how to plant, table G-16

Hollywood, Calif., part of Los Angeles; formerly separate town, annexed 1910; center for motion-picture industry; annual production of Pilgrimage Play: map, inset C-35 Hollywood Bowl, picture C-32 NBC building, picture L-315

MSC building, picture 1-315
Holly wood, Fla., eity 18 ml. n.e. of
Miami, on Atlantie; pop. 14,351;
resort; fishing, dog and horse raclng; electronics, apparel, headwear;
winter home, Riverside Military
Academy: map F-159
Holly wood Bowl, Los Angeles, Calif.,
60-agre natural amphithester:

amphitheater: 60-aere natural musical and dramatic functions held here include symphonies, operas, and the Easter sunrise service: pleture C-32

Hotm, Hanya, American dancer, choreographer, and teacher, born Worms, Germany; studied wth Mary Wig-man; came to U.S. 1931; important work at Bennington College Ver

moni D 14k
olme Coustince (Mrs Frederick,
Burt Lunchard) | ngilth novelit
lorn in village f himiliarus West Holi torn in village I high married were distinctive novels. The Old R ad from Stain The Trumpet a the Day Benniful Ford France Dist Benuliful End Frame Vic Heureuse Jini ward (1941) for The Splendil Filring as less niece of Imaginalise English by author whose work hid formerly

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Holmes (Ellis) Button thora 1870)
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Ill lectures called The Burton
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bicame independer (1919) polor
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(192-1507) Wolmer Mary Jane olmen Mary Jans (190-1907) writer of high y acadin color lovely of domesti life born Bruckfield Mass (Tempest and Sunshine Lena Rivers) A 229

Helmes Oliver Wendell (1809-94)
American p el and estayist
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H 408 Helmes Sherlock in Conan Deple s detective stories merselous ame unrasele che

teur detective who us meet baffing mysteries
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fine museum eshibite chief Da
reau ni Anerican Etheol sy
curator anitropology U S vicinosi
tional Museum and Automala size
tional Museum and Automala size tional Museum and National Gallery of Art ( Hahdbo k of Ab right and American Antiquit es Pottery of the Ancient Pueblos;

Reimium a chemical element fables P 151 C 214

Holocene (halo een) enach in geol ony the period of recent time ony the period of recent time in cluding the prevent diagram i 58 table G 57

note G or Holofornes (holofornes) Assyrian general siain by Judith story told in book of Judith in the Roman Catholic B ble and i the Protes (an) Old Testament Apocrypha

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cluding sea cucumbers

Hold Axet (1860-1931) Norwegian chemist and physician associate of Dr Theodor Frölich experiments with scurvy V 437

Holsi Gesley Throdore (1874-1834) English composer of Swedish de ecent born Cheltenham Glouces ecent born Chelcentam Great tershire musical settings for poems tershire musical settings for poems ( Hymns from the Rig Veda Ode to Dealh ) choral works ( Hymn of Jesus ) great orchestral suite The Planels ) operes (The Pertect Fool )

olstein (helstin) former duchy eince 1868 peri of Schieswig Hol Holstein (höl stin)

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	•	1314-4330	Bavaca (rval
	Saxon Luco	1314-1230	
189-936	Henry I the Fowler		Fa 1 of Austria
676-9 3	Otto I the Great		LUXERST BG LANG
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993-1002	Otto III	1378-1109	W cm pelaya
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M 25cd table C 142 composition of sullt table C 143 Relation River branch of Tennessee River rises in a w Virginia and flows 200 mi a w into a Tennessee staps T 59 67 stage T 57 67 lott Hemilton (1879 1951) edito and educator both Frooklyn N T editor and owner The Independent

1913-91 president Rolline College (Winter Park 1 la ) 18-5 49 then president emerius guished Americane 4 Undistin president guished Americane; Heil L(giber) Emeuet (1855-1994 physician born Webster N Y authorily on care of children (Tr Care and Feeding of Children (1855-1994)

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rure at 113 Hely Greil or Sangrest legendary cup used by Christ at Last Supper

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Palestine
Holy Legue (1511) formed by Pope
Julius II Ferdinand II of Spain
and Venice to Tree Hely from
French rule later joined by Em

French rule later joined by Emperor Meximilian and Henry VIII

Boly League (Celholic League)
formed 1-78 calentible to surpress formed 1-76 celevilyty to supprese Husuanois and to support Roman Caih ic religion in France but cheft to place leader Henry duke of Gune on throse later to the Henry the Henry Hill disbanded 105 to by Henry Hill disbanded 105 to by Henry Hill disbanded 105 to by Lord Hill disbanded 116 to to the Henry of Roman Catholis to the Lord Henry Seme Callers at the et Oak land Calif Roman Catholis to

won en founded 1880 arte and

Halr Pamee College of Spokene Roman Colholic for The set Roman Celholic for opened 1907 arts and WOMEN

aclences education Halyanke (hölt ol.) George J (1817 1998) Phyllah writer and reformer championed to operative novement and acculariem lest person to be imprisoned in England for blee

Hely Office Congression of the fudi eial body of Roman Calholic church headed by the pope and a cardinal

ncauct sy the pope and a cardinal bools passes judgment on heresy mixed marriages and questions of dispensation | 151 Helyoke Mass city 8 ml n of Saringfield on Connecticut River

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chinery map M 152
Holyeke Mount a steep hill 6 ml n
of Holyeke Mass femous for
view of Connecticut Valley from its

view of Connecticul Valley from its sumthit 954 if high wop M 174 Hely seders a sacrament C 302 Hely Bomes Empire H 408-8 A 498-7 See ulso by Index Austris Ger-meny history of olse emperors by name For list of rulers of the

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Crusades C-519-22, pictures C-520-1 Holy Sepulcher, Church of the, Jerusalem J-336

Holy Sepulcher, Order of the. Sec in Index Order of the Holy Sepulcher Holy Thursday, or Maundy Thursday E-200

Holy water, water blessed by priest and used by Roman Catholics, Greek Orthodox, and some Angli-cans In making the sign of the cross; used also in ceremonies and sacraments.

Holy Week E-200

Holz (hölts), Arno (1863-1929), German poet, critic, leader in German naturalism; sought to free language conventionality; from rejected rhyme and strophe in verse.

Homage, a feudal ceremony F-61 Home Affairs, Secretary of State for, In British cablnet C-4

Home and school

kindergarten link between K-41 Parent-Teacher Associations P-80

Home demonstration agent, woman trained in home economics working in county in Extension Service. Works with individuals and women's groups, such as Home Demonstration Clubs, mainly in rural areas. Takes leadership in study of food, nutrition, and clothing, and alds in other activities for community hetterment. Assists 4-H Clubs. Number of counties employing home demonstration agents in 1954, 2569; F-32. Sec also in Index Federal Extension Service

Home Demonstration Clubs, Ameri-can women's organizations, chiefly in rural areas, in connection with Extension Service. Programs are Extension Service, Programs are usually planned locally and are directed by home demonstration agents and local leaders. While programs are devoted largely to food preparation and prescription, nutrition and diet, clothing and dress, clubs work on many projects for community betterment. In 1954 there were more than 65,400 clubs with an enrollment of more than 1,520,900 women. Movement is spreading to urban areas. Sec also in Index Federal Extension Service

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Home nursing H-4100

Homeop'athy, a system of medicine founded by Samuel C. F. Hahne-mann; treats disease by administering drugs which excite in normal persons symptoms similar to those of disease treated ("likes are cured by likes").

ome Owners' Long (HOLC), U.S. R-205 Nome Lonn Corporation

Ho'mer, ancient Greck poet H-415, G-209, picture H-415

life of early Greeks pictured G-196 translations H-415: for children L-273; Pope's P-369 words used E-374

Homer, Louise (1872-1947). dramatic contralto singer, born Pittsburgh. Pa.; married Sidney Homer, composer; distinguished by a voice re-markably even in quality over a great compass; notable roles, Amneris in 'Aida'; Laura in La Gioconda'; Ortrud in 'Lohengrin'.

Homer, Winslow (1836-1910), American artist H-415-16, picture H-415 'Breezing Up' P-32, color picture P-32 'The Gulf Stream', picture H-415

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Honey mesquite M 175 picture M 175 Heneymoun origin M 10Ls Honersockie various shruba beating fragrant frampet shaped flowers H 418 St fare H 416

Japanese honeyeuchle picture H 418 color picture F 177 w d honeyeuchle or scales A 542

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erale Civil Wer generel borr Owingsvie Ky commanded di vis one et Gellysburg and Chicka mauga commander of Army of the Tennes as succeeding Johnston 256 Cefeet at Neshvile T 161

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designed Tribune Tower Choogo
1922 his New York Cily firm aided
in Rocksfeller Center development
Mood Rabin See 51 Indee Robin Hood

allocd
oud Semmel Viscomnt (1724-1615)
English navel commander in chief
in America 1787-71 div ngulehed
in bert es 1780-33 with Franch flest
under De Grasse in Mediterraneon Hoad

under De Grasse in Mediterrancon 1792 great tectic 20; Icod Thomas (1788 1645) English port and humoriet born London fains rests on his serious poems of The kong of the Wirr The Bridge of Sighs Mics Kilmanegs and The Plea of the Midsummer Mond end Th

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picluree H 428s F 225 Hool and mouth disease See in Index Foot and month d sease Hosft

ost (h5ft) Pirter Cornelisacou (15st 1641) Dutch post, historian and gramalisi born Ameterdam stud ed lew and history et Leyden translated Tacilus into Dutch and followed his style as historian founded circle of inlellectuals in cluding poel Sir Constantijn Huy gens (prosa works Henry IV of

tral A wer C3 agriculture II 416-17 der Decorations of honor im-French u Cefman w gem fo thin then A-French naml (Jean) nh-French f (n'in emrs) g-German gutturel ch

Pieter de

Hooghly, or Hugh (hog'li), the westernmost channel in Ganges delta G-10, mop I-54

Howrah Bridge B-308, picture C-20. See olso in Index Bridge table

Hook, in boxing B-269, pictures B-267, 269 Hook cast, in fishing,

Hooke, Robert (1635-1703) English physicist, born Isie of Wight, made curator of experiments to the Royal Society 1662, and secretary 1677-82: first scientist to recognize prin-ciple of planetary motion work furnished basis for Newton's theories

law of elastic displacement W-85-6 watch spring, first to use W-56

Hooker, Joseph (1814-79) (Fighting Joe), Civil War general, born Hadley, Mass.; commanded Army of Potomac (1863) succeeding Burnside; resigned command after losside; resigned command after los-ing battle of Chancellor-wille later commanded victorious Army of Cumberland at "Battle above the Clouds": C-199, C-335 Hooker, Sir Joseph Dalton (1817– 1911), English surgeon and natural-

Important additions to lst; made botanical knowledge, expeditions to Antarctic regions Australia, the Himalayas, and Syria, with George Bentham, wrote Genera Planta-

Bentham, wrote Genera Planta-rum'; friend of Darwin. Hooker, Bichard (1554"-1600). Eng-lish author, wrote 'Laws of Ec-clesiastical Polity'. a masterly exposition of philosophical and political principles, it has been called litical principles, it has been called the earliest English proce work "with enough of the preserving sait of excellence to adapt it to the mental palate of modern readers." Hooker, Thomas (1556-1647). Puritan clergyman, born England; helped form (1642) New England Confederation: A-207-8 in Connecticut C-449, M-137 Hooker, Mount, Canada, peak near boundary of British Columbia and Alberta; elevation 10,782 ft.

Hook of Holland (Dutch Hock van Holland), point of land at mouth of Maas (Meuse) River, 18 ml. from Rotterdam, mop B-111

Hook slank, of fishhook, list F-118h Hookworm, intestinal parasite H-419,

W-303

Hoonah, Alaska, viliage on Chichagof Island, in s.e. Alaska, 50 ml. s.w. of Juneau; pop. 563; U.S. government school for natives; fish canneries; sawmill: mop A-135 Hoop ash. See in Index Black ash

Hooper, John (1495?-1555), English martyr, bishop, and religious re-former; hurned as heretic in reign of Mary I.

Hooper, William (1742-90), signer of Declaration of Independence; born Boston, Mass.: North Carolina's delegate to Continental Congress (1774-77)

signature reproduced D-37

Hoo'poe, any bird of the genus Upupo, native to warmer regions of Old World; common European hoopoe about size of hluejay; plumage black white, and huff; long pointed bill; large erectile crest.

Hoop skirt D-147

Eugénie crinoline D-150-1

Hoop snake, a mythical reptile said to overtake victims by holding its tall in its mouth and rolling like a hoop; its tail said to have poisonous sting. Story common in se. U. S.

France', 'Dutch History'; poctry:
'Minnellederen', 'Baeto').

Hoogh, Pieter de. See in Index Hooch,
patriot B-334

Hoo'sac Range, a spur of the Green Mountains in n.w. Massachusetts (Spruce Hill, 2588 ft), map M-124

Hoosac Tunnel, In n.w Mass, through Hoosac Range to North Adams

Hoose Range to North Adams
T-209, mop M-132
Hoosle River, 90 ml. long, rises in
n.w Massachusetts, flows n.w.
across s.w. Vermont into New York emptying into Hudson River, maps M-132, V-457 'Hooster Schoolmaster, The', novel of Middle West pioneers by Edward

Eggleston A-229

Hoosier State, popular name for Indiana 1-73

Hooton, Earnest Albert (1887-1954), anthropologist, born Clemansville, Wis began teaching anthropology at Harvard University 1913 profes sor 1930-54 and curator of Peabody Museum 1914-54 ('Up from the Ape' 'Why Men Behave Like Apes and Vice Versa')

Hoover, Herbert Clark (born 1871), 31st president of United States H-419-24, pieture H-419 administration (1929-33) H-420,

421-4, U-387-8

agricultural pollcy H-421-2 arbitration Tacna-Arica A-294 onomic conditions der H-422-4; progress H-421 economic depression

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tion H-423 relief measures H-423

Roosevelt and R-204 speech at Harding's tomb H-268 Young Plan W-242, 244, picture

ancestry and early life H-419-20 Belgian relief work H-420 characteristics, business and political H-423

defeat in 1932 election H-424, P,-203 election to presidency H-421
Famine Emergency Co

Committee (1946) H-424 food administrator (1917) H-420

mining engineer H-419-20 secretary of commerce H-421 wife W-129, H-420

Hoover, J. Edgar (born 1895), lawyer and criminologist horn Washington. D.C.: special assistant to attorney general 1919-21; assistant director, Federal Bureau of Investigation 1921-24, director after 1924; raised standards of bureau and founded

standards of bureau and founded laboratories for crime detection. Hoover, Lou Henry (1875-1944), wife of President Hoover W-129, H-420 Hoover Dam, formerly Bouider Dam, in Arizona and Nevada. on Colorado River D-6-7, 11-11b, C-415, diogram D-11b, mops A-352, N-133, C-414b, pictures D-10-11, C-414b. Sre also in Index Dam, table Lake Mead National Recreation Area N-38d, C-414b-15, mops N-18, C-414b, picture C-414a size compared with other structures, diogrom D-11b Hooverize, World War I H-420

Hooverize, World War I H-420 Hoover Library on War, Revolution, and Peace H-424

Hop, a plant. See in Index Hops hop, Japanese, an ornamental twining berb (Humulus joponicus) of the mulberry family, usually with

pretty 5-lobed leaves splashed and streaked with white; hardy annual. Hopalong Cassidy. See in Index Boyd, William

Hopntong (ho-pat'long), Lake, in New Jersey, 24 mi. w. of Pater-son; about 8 miles long; popular summer resort map N-164

Hop clover, picture S-133

Hope, Anthony, pen name of Sir Anthony Hope Hawkins (1863-1933), English novellet; 'The Prisoner of Zenda' and 'Rupert of Hentzau' set fashion for romantic comedies involving noblemen of ficti-tious principalities; later works deal with social and ethical problems

Hope, Bob, real name Leslic Townes Hope (born 1903) actor, radio and television entertainer, born London; to US 1997, on stage from 1927 (Boherta', 'Ziegfeld Follies'; 'Red, Hot and Blue') in radio from 1935; entered motion pictures 1938 (Thanks for the Memory; The Road to Zanzibar': 'Pale author 'I Never Left Home'. 'Palefacc');

Hope, or Hope Blue, 45½-carat diamond of pronounced blue color, named for Henry T. Hope, London hanker, who acquired it in the 1820's purchased in 1911 by Ed-ward B McLean of Washington, DC This diamond is believed to DC This diamond is believed to he part of a large Indian stone which Tavernier sold to French Crown in 1668: picture D-79 one College, at Holiand, Mich.; Reformed Clurch in America; founded 1866, arts and sciences, because additional companies

business administration, economics. music

Hopel, or Hopel (hô'pā'), formerly Chihli (chć'le'), province of n.e. China; ahout 55,000 sq. ml.; pop. 28,529,039: important cities Pelping and Tientsin; millet, wheat, sor-ghum, maize, coai, iron ore: map C-260

Hopewell, Va., industrial city at con-fluence of Appomatiox and James rivers 20 ml. s.e. of Richmond; pop. 10,219; nitrates, rayon, paper. pop. 10,219; intrates, rayon, paper, wood pulp and pulp board; purified cotton linters: mop V-487

Hopewell entlure, of prehistoric North American Indians I-109, M-438-9 relics, picture I-108e

Hopewell Village National Historle

Site, near Reading, Pa. N-20
Hophornbeam, a genus (Ostryo) of
slender trees with very bard
wood, brownish furrowed bark;

often planted as ornamental tree.

Hopi (ho'pe), tribe of Pueblo Indians
living in Arizona P-431, A-346,
table I-108

customs A-357

doll, picture A-357
pueblo, picture A-355; Walpi, picture I-92

snake dance, color picture I-106 Hopkins, Arthur (1878-1950), play producer, horn Cleveland. Ohio: plays produced include 'Anna Christie', 'The Beggar's Opera', 'What Price Glory', 'The Petrified Forest'.

Hopkins, B. Smith (1872-1952), chemist, horn Owosso, Mich.; professor of chemistry. University of Illinois 1923-41; with colleagues discovered illinium; early researcher on the rare earths.

Hopkins, Ernest Martln (born 1877). educator, born Dunharton, N.H.; organized industrial concerns 1910-

16; president Dartmouth College 1916-45. Hopkins, Esek (1718-1802), first com-mander of American Navy, born Scituate, R. I.; captured British fort and naval station on island of

New Providence Bahamas 1776 dismissed for later failures N 91 Navy Jack first F 1800 rotor pic fure F 128 Ronking Bir Frederick Gow land (1881-

Hopkins Mr Frederick How home (1961-1941) English blockemist pro-fessor al Cambridge in versily after 1914 Nobel prize 1929 work on vilaminy V 427 Hopkins Gerard Munis (1844-89)

Inglish poel converted to Roman Calholic faith ordained a priest Callotte takes strained a priess 1877 poems show originality of words and rhythn (Wrack of the Deutschland Lind Basty) L 3804 Hopkins

opkins Harry I (1830 1946) public official horn Slone Cry Iowa fe leral emergen 3 r jef sal (1830 1946) ministrator 1947 works process Aln injected r Judo 4 1 2 were lary of commerce 1 18-4 upe lat advisor to F D I use elt after 1940 adn inlairnt r of lend lease program resigned | 45

Ropkinn Johnn (173 - 1873) financief and philanthropist born on farm in Mary land merchant and lead no Inancer in Ballimore founded Johns Hopkins University and Johns Hopkins Respital in Ballimore

Nopkins Mark (1802 871 squeator and author born 91 ekbridge Wiss president Williams College 1836president Williams College 1835-72 stressed the developm out of the

individual student Carneld praises G 20 Hall of Fame lable H 249

Hepkins Oceanus son of Staven Hop-kine a Mayfloner pligrim born et 808 M 140

Hopkins Stephen (1"07-65) signer of Declaration of Independence born Providence R I governor of Rhode Island 1758-68 planature reproduced D-37

Hepkinson Francis (1727 91) American juriet and post one of signera of Declaration of Independence admiralty judge of Pennsylvania signature reproduced D 37

song writer M 466 Ropkinson Jeseph (1770-1842) American jurist son of Frencis Ropkinson author of Faulton Suilhor of Hail Columbia N 40 Ronkinson

Hopkineville by city 60 mi n w of Nashville Tenn pop 12 598 lo Nashville Tenn pop li bacco market flour mills tural coal and ilmber agricul. Interests tural coal and limber interests
Belhel College map K 10
Hop o My Thumb a fairy hero of

several nursery stories

Several nursery slories
Hoppe (App e) Willie tWilliam Fred
erick Hoppe) (born 1857) billiard
player born Cornwall on the Hud
son N Y began career as this
held 51 world they first 1956
(131 balk line) had 1952 (thee
cushion) relired from lourninger. competition 1952 continued in es hibitions author of Bi liardy As It Should Be Played picture E 144

Hopper Edward (born 188\_1 painter and eicher born Nysck VY im topper Edward (form 188-1 Balmes and eicher born Nyack YY im Dorlant in American some puint lina (small town scenes railwaf tracks and Irans old houses) naturalistic highly simplified worth the Louely House picture A 4666-

Reper (William) In Wolf (1858-1935) American actor starred in Gilbert and Suillvan's operas especially The Mikado, Pallence H M S Pinafore

Hopper car a railroad car picture Hoppner John (1758-1810) English portrait painler rival of Thomas Lawrence ('Nelson') u-French u German & gem go thin then w=French manif (Jenn) sh=French f (r in arure) x=German guitural ch

Hope climi ing herbs whose fruits are Hern musical II 426-7 picture H 427 used in brewing I see H 424 hervesting picture W 47

Hop sarking a course fabric of jute and hemp made into sarks for hops also a rough loosely woven fabric Happantch

also a rough loosely woven known of coition raybe likes for wool spanish that a raybe likes a same player hops from one di a diagram to another of a diagram a rich of a diagram a rich of the diagram of the coition of the diagram of

In golden Wash porl on Grave Her lor 80 in s v of Taronna pop III's lumbering and fishing ship Ing interests steps W 44 H 252 Borace (Quintus Horalius Piace, s) U 252 s ac) I tin hre poet L-151

pict re R 101 son of a freedman 9 188

Borne Sen 11 hd 2 Hours

Barneth (hu rf n) 5) three legendary 170000 Harath (ha rf a) s)

Roman hernes R 181 H rollo (horqui d) ut Shake peares Han |e| devoted triend of

Ro nlet Bornius Cockes (hithit') legendary oman hero M 3-4 rolor ps (ure 25 3

Harn board or hearhoused bitter are trait perennial herbs comprises the constitution of the mint lye tenn the grau depret as of the mint fam by the c me on or white here hound (Barr buse clears) found in heat regions of Europe and in the 1th the bushy percental 1 to 1th this with round he winkled leaves covered with plate does not

nhorse of en all white flowers it f r coughs also in the making of a canda

A Condy lergam Niephen Heary (1954-1941) inventor of baltone enerasing process born near borfolk va first halfone was made for New York Dally Cro J., blanch 4 1850 Hergen York Daip (ra 1, blarch 4 1830 whiteh lho radon) circuar line formed by apparent meeting of earth or rea and sky a sattronomy eirofs formed by plane passage through center of the earth perpan-Darisan

d culas to line of gravity produced to meet the heavens Herison art fic al naviation A 92,

Rortron Clab C 54 85 Merison ties in picture P 160 picture P 160 Rerisontal alabitirer in accolune A 99
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mus at entrance to Pers an Gulf to Middle Ages seal of trade between Persia and India

Ormez Straft of Sec in Index Harmus Strate Morn Ganner (born 1894) Norwegien Mero Bussaer (born 1884) Norweglen Arelic explorer in 1920 discovery emoins of Andrée expel iton finds photographs picture P S51 Barn or Roofa Pallip de Montmo-rency Canat (1518-68) Firmich patriot P S54

patriot P 334

Roya Cape most southerly point of

Royal Cape most southerly point of

Royal Cape most southerly point of

Wollaston group a Thera del Pueco

C 25c S E3a E3s P form 8-272

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bugle R 34Z Sacred ram s horn picture J 354 Horn of animals II 426 See also in Index Antier commercial uses 31 426

osunguished from anilers H 426 shedding A 262 H 426

Hor madoy William Trople (1854-1937) zoolog st born Piulnfield Ind director of New York Zoologi cai Park 1838 1926 Introduced leg cal Park 1895 1926 introduced tep blation to protect and increase wild life W II am T Hornaday Memorial Poundal on in opporated 1944 e tablehed children a natural history museums throughout US (America Thirly

can Astural History Years War for Wild Life ) bisco R 199 Harr beam archeom a genus (Carpinus) of trees of both family with hard trees of otto samely with mar-trees used and smooth gray tark also called American hornbeam forwood blue beech and water

beech Morab II # tropical bird H 427 formbleade a hack or greenish black mineral ontaining chiefly iron cal cum inspessia and alumina found in crystells and granular masses a common constituent of Branke and other igneous rocks

Bernbook primer used in English as late as time of George II consisted uses by of angle leaf with alphabet in large and smell letters Lord a Praver and Romen numerals set in mood frame and protected by trens purent horn pict re E 241

Purent nov.

Mare Book, magar ne L 27a

Horsby C H rt sons (1887-1746)

Idgiss booked er and amajeus

Dr neer schucated at Oxford and called in lisher printed privately
(4thendene Press) email editions
of betutiful books, Dente (in fol c) and hips a diritur are among mastern sees of modern printing

mastern sees of modern prinling
Forse Heart Sherial? Heres first
Haran (1801 1878) British general
nen 10 Near Least with Kitchene
in 1914 commander of First Army
1916 reni of full general 1819
and meda beron Rr E bert Stevenson (1871-Harns

1940) Brill h political lender min-later of labor and presiding officer Assignational industrial Conference 1918 presuent of Board of Trade 1920 chencellor of exchequer 19"1-22 Morard date or ererk chub D 1

Horned dark L-103 color picture 12 1 60

Courtably flights B tTL Best picture L 103 Borned Owl O 431 pictures O 431, R 159

Harned pheasuni or irasopen a bril hant bird of the ilimatavas ha bornika projection behind each Harned pappy Bee In Inter Clau chum

Higgar I estilemaky or side winder R 78 Morned tond a lizard L 283 picture N 53 protective coloration picture P 421

Harned vierr V 477
Harned NT manufacturing city
and trade center on Cantateo River and Irade cenier on Cantateo River 18 Rai s of Rochester pop 15 049 milk slik priming and dyeing rail tood shops map h 204 Harbet a solial wasp H 427, W 43 color primer 11546 class fied V 53 Hernet Lawrences ship L 140

Horney (hôr'nī), Karen (1885-1952), American psychoanalyst, born Ger-many of Norwegian father and Dutch mother, came to US 1932, American psychoanalyst, ooth Germany of Norwegian father and Dutch mother, came to US 1932, became citizen 1935; in 1941 she helped found American Institute for Psychoanalysis, New York City, dean 1941–52; author of 'Self-Analysis', 'Our Inner Conflicts', and 'Neurosis and Human Growth': P-425

Hornfels, rock R-170

Hornpipe, musical instrument of Celtic origin, consisting of wooden pipe with reed mouthpiece, in modern usage a lively dance accompanied

by a tune (hornpipe) in duple time, distinctively a sailor's dance Horuwort, an herb (Ceratophyllium demorsum) of the family Ceratophyllaceae, growing under water, leaves divided into three threadlike rigid parts resembling a horn, used in aquariums color piture P-286 Horny sponge, picture S-353

Horology, science of measuring time See in Index Clocks, Watches Horowitz (hor'o-tits), Vladimle (born

1904), Russian pianist born Kiev, brilliant technique and flawless execution, debut in United States 1928, married daughter of Arturo Toscanini,

Horrid he'loderm, a poisonous lizard, picture L-283

Horrocks, Jeremiah (1617"-41), English astronomer, horn near Liverpool: first to observe transit of Venus 1639; from these observa-tions, computed the solar parallax, providing a basis for determining the dimensions of the solar system. See in Index Hengist and Horsa. Horsa

Horse H-428-9, pictures H-428-428d, 1-1, toble H-4286

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Horse bean, a tree See in Index Jerusalem thorn

Horsecar, a streetear drawn by horses S-429-50, picture S-430 Horse chestnut B-338. See also in

Index Buckeye leaves, pictures L-151-2 twig diagram P-298

Horse chestnut famils, or Hippocas-tanaceae (hip-po-las-ta-na'sō-ē) a family of shrubs and trees native the north temperate region, luding the Ohio buckeye Including sellow buckeye, California buckeye, common horse chestnut, red horse chestnut, woolly buckeye dwarf horse chestnut or bottlebrush buckeye, and Japanese horse chestnut Horse conch, a shell S-139b

Horse family, or Egoldae (il.'wi-de), a family of one-to-d, hoofed animals with peculiarly ridged and holloy ed teeth; includes horse, ass and zebra

Horsefly. two-winged the order Diptera, family Tabant-dae; also called gadfly, usually about 3 times size of housefl); has pointed proboscis, only females such blood; males sip plant sap or

nectar: color picture I-154d Horse Guards, Royal, England L-303, map L-301, picture L-305

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uses H-243 Horseheal. See in Index Elecampane Horse latitodes, a zone of light winds hetween the trade wind and pre-vailing we-terly zones W-153, dio-gram W-154

Horse leech L-158

Horse mackerel, name given to several members of the mackerel family, particularly to the Atlantic tuna (Thunnus secundodorsalis) and to the blue-finned tuna of the Pacific (Thunnus thynnus): T-205

Horsemen. See in Index Four Horsemen of the Apocalypse

Horsenettle, perennial plant (Solanum carolinense) of the nightshade family; native to North America; grows 1 to 4 ft halry, grayish with long yellow prickles; a common weed in waste places.

Hor'seus, Denmark, seaport on Fiord of Horsens, 22 ml. s w. of Aarhus; pop. 25,893; Iron products, ships, woodenware: exports butter and hacon: mop E-424

Horse of Troy, story of T-191-2 Horsepower P-403 Horse racing H-428b, d course at Buenos Aires, picture B-340

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Horses of St. Mark's, a famous bronze
group above main entrance to St.
Mark's Cathedral in Venice, picture 1-281

Horse stinger. See in Index Dragon-

Horsetail family, or Equisetaceae (th-toi-se-tu st-t) a family of perennial plants of one genus, native to tropical and temperate regions including scouring rushes or horsetails

Horsetails, or scouring rushes P-289, F-52, 54, picture F-54 spores S-355, F-54 Horsetails, cloude C-359

Horse wrangler, on western cattle ranch C-150 Hor'la, a city of the Azores capital of

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wine, grain A-542
Horten'alan law (lex Hortensia), in
Roman history R-184
Horthy (hôr'te) de Nagybanya, Nicholas (born 1863), Hungarian admiral; elected regent of Hungary
1920, overthrown Oct. 1944; Suppressed attempts of former King Charles to regain throne. H-450

Horticulture, as vocation. See in In-dex Fruits and fruit growing; Gardene and gardening; Plants: Shrubs

Horton, England, Milton's home M-257 Horus (hô'rūs), ancient Egyptian

falcon symbol of, picture E-278b temple, picture A-305 Horns, son of the Egyptian god Osiris

O-426a

Horwich, Frances R (appaport) (born orwich, Frances R(appaport) (1908), 1908), television star, educator, and writer, born Ottawa, Ohlo; professor of education Roosevelt College, Chicago, Ill., 1946-52, also department chairman 1947-52, took leave of absence Oct. 1952 to star as Miss Frances on television nursery-school program, Ding Dong School; president National Asso-ciation for Nursery Education 1948-51.

Rosain, or Hoseln, grandson of Mo-hammed. Sec in Index Hasan and Husein

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Hose, garden jet principle explained J-340

manufacture R-240
Hosea (hō-zd'a) (8th century 2C.).
Hebrew minor prophet; wrote 28th
book of Old Testament: P-418,
J-352

Hosiery. See in Index Stockings

Hos'mer, Harriet (1820-1918), sculptor, born Watertown, Mass.; 2 classicist; lived many years in Rome ('Puck'; The Sleeping Fam'). Hosoda Eishi, See in Index Eishi, Hosoda

Hosoda Hospitalers (Order of the Hospital of St. John of Jerusalem). See in Index Knights Hospitalers of St. John

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rying out the outiline of a Irealy outels overnight a mindal ons Rostels Translers are tally elers to thin in the for h tels e i travelers tuth lished in Germani 1 n is 1934 by the Amerian bouth Hos-tels Inc. with note had head quarters at New Yiki is abut 250 youth hostels in It sendout tours to Euripe Canada Alaska

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Hostos y Boulliu (os fos e bo në lya) Pugento Maria de (1839-1903) Latin American writer L II 4

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worked in gun factory in youth insented guns and projectiles fa-mous for Hotchkies machine gun Hetel do ville (8 Ici de tel ) French for town hall

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magician and writer born Apple-ion Wis funed not only for his own remarkable tricks but for ex-posing those of spleitualistic me dums and frauds (Paper Megic The Pigh) Way to Do Wrong Pope Tas and Escapes) picture 1940 (o dő: ) Jean 4 delne (1741– 1928) Fren h a u i toč eculptures 5 78d-9 Henjamin Frank

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pelroleum refin ng P 178 Hough (& /) Parrage (1857-1923) journal of and novel of I Lorn New ion lown causaised for law but practiced fittle wrote realistic and histori at no es of 1 fc in West (The Massampl bubble fittle four Farly or Figl.) The love of Waton worth of Th rty Six) law

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Peace Comm so on 1919 W 234
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I do not expect the Unon to be disolved.—I do not expect the Unon to be disolved.—I do not expect the homeomer be done to the disolved the United States of the United States of

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Agency, National (NHA), U.S. R-205

Housing and Home Tinance Agency, U.S. U-368

United States Housing ousing Authority, United St (USHA) B-345, picture R-208

Alfred Edward (1859-Hous'man, 1936), English poet and scholar; professor of Latin, Cambridge; edited classical works; lyrical poems express exquisite sensitiveness to beauty and cruelty ('A Shronshire Lad': 'Last Poems'): E-382a-b, Lad':

quoted L-382b, P-335

Housman, Laurence (born 1865), English writer and illustrator, brother of A. E. Housman; wrote children's of A. E. Housman; wrote trades: stories ('What O'Clock Tales'), novels ('An Englishwoman's Love Letters'), plays ('Little Plays of St. Francis' and 'Victoria Regina'), reminiscences ('The Unexpected Years'), and poetry ('Green Arras' and 'Spikenard')

"Victoria Regina', picture D-135

Victoria Regina', picture D-135 Houssay, Bernardo A. (born 1887), Argentine physiologist and biologist, horn Buenos Aires: professor of physiology, University of Buenos Aires 1919-46; for his research on frontal lobe of pituitary gland and its importance in distributing glycogen (animal stareh) in the human body, he shared 1947 Nobel prize in medieine and physiology with Carl F. and Gerty T. Corl, who did research in related field.

Houston (hūs'tun), Samuel (1793-1863), American soidler and statesman, president of republic of Texas

H-434, A-475, picture H-434 memorial day for (March 2) F-56 Statuary Hall. See in Index Statuary Haii (Texas), table

Houston, Tex., largest elty of state, 50 ml. n.w of Gaiveston Bay; pop. 596,167: H-434-6, maps U-253, inset T-90, pictures T-80, H-435 museum. See in Index Museums,

table field machinery plant, picture

presidential convention. Sec in In-

dex Convention, table Rice Institute, picture T-96

ship canal H-434, 435, picture H-435, See also in Index Canals, toble synthetic-rubber plants, picture

Hony huimms (whin'mz), in 'Guiliver's Travels' G-229, S-470, picture G-229 Hov'as, tribe of Madagascar M-22

Hore, town in Sussex, England ad-joining Brighton: pop. 69,435; forms part of famous Brighton promenade: mop B-325

Hovenweep National Monument, in Utah and Colorado N-35, mop N-18 Hovey, Richard (1863-1900), poet, born Normal, Ill. ('Launcelot and Guenevere'; with Bliss Carman, 'Songs from Vagabondia').

Howard, great English family, whose head is the duke of Norfolk, first duke and earl marshal of England, and whose branches hold many other peerages; rose to greatness and misfortune in Tudor reigns.

Howard, Bronson (1842-1908), dramatist, born Detroit, Mich. ("The Henrietta"; 'Shenandoah'). ('The

Howard, Catherine (1520?-42), queen of Henry VIII of England beheaded H-338

Howard, John (1726-90), English philanthropist and prison reformer; remedied shocking abuses: P-416

Howard, John Eager (1752-1827) American Revolutionary War of-ficer, born Baitimore County, Md.; fought at Germantown, Monmouth,

Cowpens, Eutaw Springs; governor of Maryland 1789-92; much of land he owned now in city of Baltimore.

Hounrd, Leland Ossinn (1857-1950), entomologist, born Rockford, Ili; chief, Bureau of Entomology, 1894-1927 ('Mosquitoes—How They Live'; 'The Insect Book'; 'The House-Fly—Disease Carrier'; 'Mos-quitoes of North America'). The

Howard, Leslic (1893-1943), English actor. playwright, producer, born London; New York debut 1921; stage successes 'Her Cardboard Lover', 'Berkeley Square', 'Petrified Forest'; in motion pictures after 1930 ('Of Human Bondage', 'Petri-fied Forest', 'Pygmalion')

in 'Hamlet', picture T-113

Howard, Luke (1772-1864), English seientist; invented first generally accepted system of cloud nomenciature.

Howard, Oliver Otis (1930-1909), American Civil War general com-missioner of Freedmen's Bureau missioner of Freeding. 1866-72, instrumental in establishing Howard University for Negroes, its president 1869-73 founded Lin-coln Memorial University for mountain whites at Cumberland Gap,

Howard. Sidney Coe (1891-1939) playwright, born Oakland Callf .; did journalistic work in New York; with Paul de Krulf wrote 'Yellow Jack', a play about the fight against yellow fever; plays are elever and of varying types ('They Knew What They Wanted', won Pulitzer prize 1925; 'The Sliver Cord'; 'Half Gods').

Howard of Effingham, Charles Howard, 2d Baron (1536-1624), ereated earl of Nottingham 1596; English lord high admiral; Influentiai with Queen Clizabeth I, his kinswoman Spanish Armada A-373: flagship,

Howard of Penrith, Esme William oward of Fentin, Esme William Howard, first Baron (1863-1939), English diplomat; served in Ireland, Italy, Crete, Hungary, Switzerland, Sweden, and Spain; ambassador to U.S. 1924-30.

Howard College, at Birmingham, Ala.; founded 1812 by Baptist church; arts and selences.

Howard University, at Washington, D. C., for Negroes; founded 1867; liberal arts, dentistry, engineering and architecture, law, medicinc, musie, pharmaey, social graduate school.

How'dali, box for riding elephant E-327

Howe, Edgar Watson (1853-1937), author and editor, born Treaty, Ind.; editor Atchison (Kan.) Doily Globe 1877-1911; editor E. W. Hote's Monthly after 1911 ('The Story of a Country Town'; 'Piain People'): A-229

Howe, Elias (1819-67), inventor of the sewing machine H-436, S-117 Hall of Fame, toble H-249 sewing machine H-436, picture H-436; patented, table I-199

Howe, Joseph (1804-73), Canadian statesman, journalist, orator, born Halifax, Nova Scotia; premier of Nova Scotia 1860-63, strong opponent of Confederation, but after it was secured accepted position 1867-73 in first cabinet: N-309

Tupper opposes T-210 Julia Ward (1819-1910) writer and reformer, born New York City; wife of Samuel Gridley Home; vigorous leader in many philanthropic causes and ploneer

woman suffrage movement; first woman to be elected to American Academy of Arts and Letters (1908) ('Sex and Education'; 'Modern Society'; 'Margaret Fuiler',

Modern Society; Aurgaret Fuler, blography), picture N-43
'Battie Hymn of the Republic' N-40 forms woman's club W-183
Howe, Richard, Lari (1726-99), English admirai; commanded British sea forces in American Revolution; relieved Gibraltar 1782; gained victory of "glorious first of June" 1794 over French off Ushant.

Hove, Samuel Gridley (1801-76), pioneer educator and reformer, born Boston, Mass.; founder and first superintendent of the Perkins In-stitution for the Blind; founder of the first school in the U.S. for idiots and the feeble-minded

teaches Laura Bridgman B-206 Howe, Sir William (1729-1814), British general, younger brother of Richard, Earl Howe; commander in chief of British land forces in

North America 1775-78 battle of Long Island L-311 eondemns Nation Hale H-247

proposes peace, picture R-130 Revolutionary War R-128, 128a Howe, William Henry (1846-1929). Howe, William Henry (1846-1929), animal painter, born Ravenna, Ohio; irnown especially for his landscapes with cattle ('Return of the Herd'; 'Cattle at Rest'). Howe, Cape, at s.e. tip of Australia, maps A-489, 478
Howell, Clark (1867-1936), journalist, born Barnwell County, S.C.; succeeded Henry W. Grady us managing editor 1889 (editor in chief after

ing editor 1889 (editor in ehlef after 1897) of the Atlanta Constitution, which he maintained as one of leading papers of the South; served several terms in Georgia legislature; member of Democratic National Committee 1892-1924, 1936.

Howells, Join Mend (born 1868), architect, born Cambridge, Mass.; architect, born Cambridge, Mass.; son of William Dean Howells; designer of buildings for Columbia, Harvard, and Yale universities; in association with Raymond M. Hood designed Tribune Tower, Chicago, Howells, William Bean (1837-1920),

American novelist, essayist, and critic H-436, A-230a

quoted A-230b Mary (1799-1888), English authors; husband and wife; wrote prose and verse in collaboration ('The Forest Minstrei'); also independently.

Howliver, a piece of artillery firing at elevations higher than a field gun but lower than a mortar A-397, pictures W-231, A-381, A-397 Howland Island, a tiny sand and corai

island in the Pacific, about 1900 mi. s.w. of Honolulu; colonized by the s.w. of Honolulu; colonized by the U. S. in 1935 as a way station for planes flying from the Hawaiian Islands to Australia; airport built there in 1937; pop. 4: map P-17 Howler monkey M-350, picture M-349 How'rnii, suburh of Calcutta, India; pop. 493,630; jute, cotton, iron, and machinery unaufactures: C-20-1.

pop. 493,630; jute, cotton, iron, and machinery manufactures: C-20-1, maps 1-54, A-407
bridge B-308, picture C-20. See olso in Index Bridge, toble
Hoxle, Vinnie Ream (1847-1914). scuiptor, born Madison, Wis.; commissioned by Congress to make statues of Lincoin and Sequoyah (in U. S. Capitol) and Farragut statue in Washington; first woman sculptor to receive a commission from U.S. government.
Hoy (Norse, "high Island"), 2d in size (53 sq. mi.) of Orkney Islands O-425, map B-324

author of rules of whist and other games, long regarded as authorita tive so that according to Hoyle has become a proverbial phrase has become a proverbial phrase Hradeo Kraleva (Ard dês krd it oc) formerly Kbniggelts (Aft atc frits) city of Czechowlovskia in province of Bohemil 65 mi e of I rague pop 52 292 lith century calhedral varied manufactures varied manufactures Sidowa or Königgrafia battlefield (1866) in Austro Prussian War

Hoyle Edmond (18"2-1769) Pagilsh

nearby map 1 425 results of battle C 97 Hedlicka (hur dh h ka) Ates (1859-1943) American anthropologist born in Bohemia a thority on in dians curator if a National Mu ceum founder American Journal

eeum founder Americas Journal of I hysical Anthropology |
Heelt or Kult See in Index Rollo |
Hrossy (Ards në) Triedrich Crach Bedrich (1879-1952) Cach offen tallst placed Hittile language in Indo I uropean group professor of cupeiforin research and ancient oriental history at Charles Univer

eity of Prague H 386
Reuedland Cannt or Roland hero of Charlemagne a army cejebrated in medieval legend R 178 S 415 422 (shyd) Dynasty (about 5200) China C 278 BC)

Heingan (shing da) Mongol region in w Manchurla incorporated 1949 into Inner Mongolian Autonomous Begion M 78 Region M 74
Helion M 74
Helion Manchurie Ses in Index
Changchun

Sophie Newcomb Memorial Coffess for Women. Sas in Index Navcomb College

Gollege Heun Tung See (n Index Pu yi Heu shilt chang (sku shir chang) (1883-1892) Chungs enterwan elected 1918 president of Chinesa republic resigned 18-2 Hambo Angula See is Index Nova

(hwā rā chē") Mexican Hugeaches sendala M 197

flearizo (1.4-re th5) South American fur bearing hybrid spinal a cross between a mele llama and a female alpaca Huasco Chile port about 860 ml a of Antofageata pop 3000 C 252

map C 250 Hunse (hun 15) Chilean cowboy ptoture C 255
Heavier of Heavier (nos tek) e tribe
in e Mevico along Gulf of Mexico
and to be an off-most of Blayane

Carving picture I 109 Rub of wheel W 120 Hubay (ho bl) Jone or Fogen (1858-

1937) Hungarian violinisi and com-poser born Budapesi pupil of his faiher and of Joschim work in cludes operas (The Victin Maker of Cremona Anna Karenina) concertos symphon es congs

Unbbard Bernard Baserrans (horn 1988) Jesuit scientist and lec 1888) Jesuit scientist and let-turer born San Francisco pro-fessor of geology University of Sania Clara Santa Clara Casif, atter 1926 noted for geological ex-plorations in Alaska (Blush Con Balemutes) (Sundania) writer

Hubbard Fibert (1859-1915) writer iubbard Pibert (1859-1915) Wrifer born Bloomington II founded and edited The Phillstine a magazine of protest founded Roycroft Spor Past Aurora to Garets Juneys Messuce Garets Jubbard, Rills & Joan McKinney Hubbard, Rills & Joan Series Sports Spor

abbard, Kin (Frank McKinney Hub bard) (1968 1930) carleaturist and humorous writer born Belle fontaine Ohlo on Indemapoly News after 1891 (Abs Martir a Savings)

Habbard I conides Jr (1872 1903) American journalist and exp wer with Dillon Wallace in 1903 jour neyed 250 mi farther in Labrador Interior than former white explor era died from exposure

Hubbard squash S 359 Hubble Edwie Powell (1889-1953) astronomer born Marshfield Mo at Hount Wilson Observatory efter 1915 of Moont Wilson and Pal omar observatories after 1948 [ Realm of the Nebulae ]

Huber (a ber ) François (1750-1831) Swiss naturalist first to pain secto lific knowledge of the His of bees Ruberman (ho ber mds) Brontslaw 1188\*-1947) Polish violinist beein ning 1892 had world wide success Virtuoso founded Palestine

93 Virtuoso Induded Symphony Orchestra 1685 Habert Walter bee in Index Walter

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Inch (Aga) Rhards (1564-1947)
German poet and novellet opposed heturalism outstand ng as criti and as historical novelist ( Defeat

Victory halorical romances Garibaidi The Deruga Triol) Huck or buckabuck toweling of linen or cotton with small woven design durable absorbent Gurable absorbent
Hockleberry a blueberry B 211
Hockleberry Fina The Adventares
of Mark Twain a novel about
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who resenting the restraint of elvel

ization runs away from home with his friend Tom Sawyer the two becoming involved in a series of itsely incidents connected with iley ory trophles before the Civil War A 250 T 225 picfare A 225 Bud deraffeld Engiand manufactur-ing fown 25 ml he of Manchesier pop 120.21 wool cloth center

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made himself president 1913 algued 1814 arrested in US to fomenting a revolution against Max

formenting a revolution agetim Max fee died before their like? Floor Bridge New Orleans N. 155 percent floor in the feet of th

uses saint (1024-1109) abbot of C nny barn Sëmur France ad viser of several popes added in re-form of clergy raised Abbey of Cluny to place of highest impor-tance amaigamaling other mon-strates destroit and 120

malerias festival April 29 Hugh Capet Ses in Index Capet. Hugh ings there are in smorr case. Husen tashes Charles Exams (1962-1948) American lawyer and statemen chief jublice of U S Suprema Court 11936-41) If 458-9 points Haghos

Theo love Roosevelt supports F 226 Wash ngton naval conference H 267

lingies David Edwarf (1831-1900) Amer can inventor born Pagiand invenied printing telegraph micro phone and induction balance Haghes Matcher (1881-1845) play wright, born Policille N C lone a teacher of English Columbia Uni

ta falez Ocean table im French a German i gem go thin then a = French maniffcan) ah = French j (e in arure) x = German gullural ch versity ('Hell-Bent fer Heaven', 1924 Pulitzer prize winner, folk

play of Carolina mountains). Hughes, Huward Robard (born 1905), eapitalist and aviator, born Houston. Tex.; established airplane speed records 1935-38: table A-104

Inghes, (James) Longston (born 1902), Negro poet, born Jophin, Mo.; ability discovered by Vachel Lind-say when Hughes was working as say when Hughes was working as a hotel busboy; nuch of work deals with Negro life ('Shakespeare in Harlem', Ficids of Wonder', poetry; 'Simple Speaks His Mind', short storics; with Arna Bontemps storics; with Arna Bontemps edited Poctry of the Negro, 1746-1949').

Hughes, Juhn J. (1797-1864), Roman Catholic prelate, born County Ty-rone, Ireland; hishop of New York 1842-51, archbishop after 1851; noted for humanitarian work and writings in defense of Catholieism.

Hughes, Rupert (born 1872), editor and writer, born Lancaster. Mo.; his 'George Washington' sought to strip the hero of myth and show him as a human being ('Stately Timber', novel, edited 'Music Lovers' Encyclopedia').

Hughes, Sir Snm (1853–1921), Canadian soldier and political leader

H-439

Hughes, Thumas (1822-96), Engilsh author and social reformer, founder of an experimental co-operative col-ony at Rugby, Tenn., his book 'Tom Brown's School Days' did much to fix ideals of English public schools; also author of 'Tom Brown at Ox-ford' and 'Life of Alfred the Great'.

Hughes, William Murris (1864-1952) Australian labor and political leader, born London, England; in Australia after 1884; prime ininister 1915-23; government posts 1934-41; leader (1941-43) and dep-uty leader (1943-44) of United Australian party

Australian party
Hugh of Lincoln, Saint (1140?-1200),
hishop of Lincoln; born Avaion,
France, of noble family; called to
England by Henry II to establish
English Carthusian monastery; festival November 17. Another St,
Hugh of Lincoln was an English
boy said to have been put to death
by Jews at Lincoln in the 13th care by Jews at Lincoln in the 13th cen-

tury; festival July 27.

Huginn (ho-jin'), in Norse mythology, a black rayen, picture O-341

Hugli, channel in Ganges River. Sce

in Index Hooghly

Hngu (hū'gō, French ü-gō'), Juseph
Leopold, father of Victor Hugo H-440

Hugu, Victor Marle (1802-85), French writer H-440-2, picture H-440 books by and about H-441

drama basis of 'Rigoletto' O-392 dramatist and poet, estimate H-441 leader of Romanticists H-441

Tes Misérables H-441

Tes Misérables H-441-2

Huguenuts (hű'gi-nôts, French űginő'), French Protestants of 16th
and 17th centuries H-442-3

American Colonles A-197, A-191,
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Richelieu crushes R-152

St. Bartholomew's Massacre C-382, C-194, H-442

'Huguenuts, The', opera by Meyerbeer story O-390: basis for H-443

Hukbalahaps, or Huks, Communist-directed members of a Philippine guerrilla army organized during Japanese occupation in World War II; after war kept arms and joined

peasant political parties in demanding breakun of large estates; leader, Tarue, surrendered Luis P-202

Hulagn Khnn (hu-là'go kän) (died 1265), Mongol leader, grandson of Genghis Khan, first independent ruler of Persia M-345

Hull. Cordell (1871-1955), statesman. born Overton (now Pickett) County, Tenn.; member U.S. Congress 1907-21. 1923-31; U.S. scantor 1931-32. secretary of state 1933-44; advocate of free trade, awarded Nohel peace prize for 1945 Pan American relations L-120 R-203

Who gained first American naval victory in War of 1812, born Huntington (now Shelton), Mass commands Constitution W-13

Hull, John (1624-83), silversmith and merchant; came to US from England 1635, settled in Boston. took leading part in affairs of Massachusetts Bay Colony, became master of the mint 1652

Hull, Julin E(dwln) (born 1895), U. S Army officer, born Greenfield, Ohlo; became 4-star general Aug 1951; Army vice chief of staff 1951-53; U. N. commander in Korea and eommander in chief of U S East forces 1953-55; retired.

Hull, William (1753-1825), American Revolutionary War officer, general in War of 1812, surrendered Detroit to British 1812; court-martialed and sentenced to be shot, but pardoned by President Mailson

Fort Dearborn evacuation C-237 governor of Michigan Territory 31-229

Hull, officially Kingston-upon-Hull, seaport in n.e. England on Hum-ber River; pop. 299,068; naval arsenal; ficheries; commerce: map B-325

Hnll, industrial eity in sw. Quebee opposite Ottawa, Ontario; pop. 43,-483; lumber products, matches, per, cement: O-428, maps C-69, 1Fall

aircraft carrier N-83 motorboats B-217 sallboat types B-216

ship S-158. See also in Index Nautleal terms, table submarine S-435

Hull Huuse, famous social settlement In Chleago A-17-18, P-86a

Holl Island, in Pacific. Sec in Index Phoenix Islands

Hulutnu (hli'ln'don'), Manchuria, seaport on w. shore of Gulf of Llao-tung M-75

Human behavlur. See in Index Behavlor, human

Human budy. See in Index Anatomy; Physiology

'Human Cumedy, The', name given to a series of novels by Balzec B-42 Humane Action Medal, U.S. D-39

Human engineering, in psychology P-428

Humane societies, organizations for the prevention of cruelty to animals and children H-443, pictures H-443

Among seography, study of earth as the home of man G-47, S-221

Humanism, the movement at the close of the Middle Ages that brought about a revival of classical learning and trates; also a modern literature.

and tastes; also a modern literary and philosophical movement opposed to modernism Chaucer poet of C-201-2

Renaissance R-104 Humanistic handwriting B-235-6 Humanities, in education E-252, 253 Human Nutritium and Hume Econum-ics, Bureau of, U.S. H-409, U-364, picture U-365

Human resources, conservation of. Sec in Index Conservation of human resources

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Human society, study of S-220-2. See also in Index Sociology

Human Ten Plus, a game P-320 formed by Humber River, estuary Trent and Ouse rivers in n.e. Eng-

land, maps B-321, 325 Hnm'bert I (1841-1900), king of Italy; succeeded 1878; called Humbert the Good because of courage and generosity in plague and earthquake, fostered Triple Alliance, inaugurated colonial expansion policy assassinated I-274

Humbert II (born 1904), king of Italy May 10-June 18, 1946; son of Victor Emmanuel III, for whom he became regent 1944; left Italy 1946 when Italians voted for republie.

Humblebee. See in Index Bumbiebee un'bolit, Alexander, barun von (1769-1859), German naturalist, explorer, founder of modern seience Hunr'boldt. of physical geography ('Kosmos') G-46, 47

Humboldt, Karl Wilhelm, baron von (1767–1835), German philologist, statesman, and writer, first to define philosophy of speech; brother of Alexander von Humboldt.

Humboldt Current, also called Peru Current, an ocean current which flows from Antaretic regions up w. eoast of South America; average temperature about 60° F.: O-335, 336, maps O-335-6

elimate affected: Cirlie C-250-1; Galápagos Islands G-3; Peru P-161; South America S-261

Humboldt Lake, or Humbuldt Sink, in w. Nevada; 20 ml. long; receives Humboldt River; has no outlet; usually only a marsh, becoming a lake at certain seasons: N-126, 132

Humboldt River, rises in n.e. Nevada, flows 375 mi. into Humboldt Lake (or Sink): N-124, maps N-126, 132, U-303

Humboldt State College, at Arcata, Calif.; chartered as state normal school 1913; became state college 1935; arts and sciences, education.

Humbuldt's woully monkey, picture M-348

Hnme, David (1711-76), Seottish philosopher and historian ('An Enquiry concerning Human Understanding'; 'History of England'); E-245

ume, Sannel (born 1883), play pruducer, born San Francisco: associated with Edward Gordon Hume. Craig; organized first exhibition uf stagecraft in United States.

Hume Dain, in Australia, on Murray River, picture A-991. See also in Index Dain, table Hu'merus, bone of the upper arm S-192

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gribert (1854-1921) German com poser oter born blegburg near Bonn crmany friend of Wagner whom he sseleted in producing Pure fal won fame with opera. Hancel and Gretel exerted influence on opera Gretel exerted influence on opera of his time by reviving interest in folk themes wrote incidental music for many stage product one of Max Reinherdt inc uding The Miracle See also to Index Hansel

and Gretel Hemphrey Dorie (born 1895) modern

Hamphey Davis (boys 1823) modern and observations of the control o

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mu ntsineer born indis leader or Frit sh expedition that scaled Mount Everest the aummit being rea hed May y 1925 by Tenne writes a sensier gu de and E P H lary f New Zraland Knighted Queen El zabeth II author of

The Conquest of Everest
Hant Hoissan (1827 1910) English
pre Raphsellte painter (The Light
of the Word Finding of Christ in Inc Temple ) Runt

unt Leich (1784-1859) English poet and essayist friend of Byron Lests, and Shelley (Abou Ben Ad hem Autobiography') unt Mabel Leigh (born 1492) Kunt

hem autohography)

Lens Mabel Leph (born 1992)

Lens Mabel Leph (born 1992)

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Bast Richard Meris (18-7-03)

Bast Richard Meris (18-7-03)

Lens William (18-7-04)

Lens William ( Mant marthold's Liberty Administra-tion Building of Chicago World's Fair 1992 and many other notable etructures established estrict American training school of such tecture

sren tecture
and Walter (1722°-1859) Ameri
can in entor in 1834 of first practi
cal sawing machine 8 115 117
P 287 Will am Marels (1824-78) Frent

Ment William Merris (1824-76) American Pulner born Brillicherio Li brother of Richard Morris Hunt Induenced by Berbison School painted portraits land scapes and murels unt Wilson Frice (1782, 1842) Hanl Hond Wilson Frice (1782) 1842) for trader and explorer led expended not Astors Pacific For Company overland from St. Louis to Astorie at the mouth of the Columbia Piver (1810-12) explored land and evidebland trading posts Mahn exprittion 128
South Dekots traversed 8 305

Hanter John [17 & 93) British phys lologist and surgeon born Glasgow Scotland one of world wareste ane tomints mark led to notable ad

vances in surgery introduced ex vances in surgery introduced ex-periment into study of physiology burjed Westminster Abbey M 185 Hunter Kermit (born 1710) C ama list, born West Vibinia (Unto These H lis.) P 19a

Hapter Robert Mercer Talinterre (1809-87) Confederate secretary of stato (1881) and peace commis-sioner (1885) born Freet County Vs. member of Congress 1837-41 and 1845-47 in senate 1847-81

end 1835-4; in senate (84) of the Hanter Walter Samuel (1889 | 9 4) psychologist, author and editor born Decatur III professor I ni versity of Kansas Lawrence Kan

1916-25, Clark University, Worcester, Mass., 1925-36; professor and department head Brown University,

Providence, R.I., 1936-54: P-428
Hunter College, at New York City,
part of the College of the City of
New York; municipal control: New York; municipal control; established 1870 as Normal College (name changed 1914); arts and sciences; also model kindergarten. elementary school, and high school: N-223

United Nations meets at U-240b

Honter's fire, or trapper's fire C-61

Hauter's moon M-387 H-451-451b.

nictures Hunting H-4510ammunition used A-2360, picture A-236

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fox D-110b, picture E-349: 'Wolf and Fox Hunt', by Rubens P-27d, color Fox Hunt', by Rubens P-27d, color picture P-28

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gun handing, 4-17 horns used H-427 coverning H-451b, B-195-6; laws governing H early laws B-194

opossum O-399 quall Q-1 rhinoceros R-135 scals, picture E-394 tiger E-327-8

Hunting dog D-1100-b, pictures D-110, 117, H-451a, color pictures D-112-14, table D-118-1180

tralling coyote, picture H-451a Hunt'ingdon, or Hunt'ingdonshire, a small Inland county in e. England; 366 sq. ml.; pop. 69,273; cap Hunt-ingdon (pop. 2499); map E-347

Huntingson College, at Montgomery, Ala.; Methodist; chartcred 1854, opened 1856 in Tuskegee; moved to Montgomery in 1909; arts and sciences.

Honting leopord, or cheetah L-171

Huntington, Anna Hyatt. Sec in Index Hyatt, Anna Vaughn

Huntington, Collis Potter (1821-1900) American capitalist, horn Harwln-

ton, Conn.; one of chief promoters of Central Pacific, Southern Pacific. and Chesapeake and Ohlo raiiroads.

Huntington, Ellsworth (1876-1947). geographerand explorer, born Gales. burg, Ill.; research associate, Yalc University; expeditions into Asia; made studies of climatic variations and weather changes ('The Pulse of Asla'; 'The Climatic Factor'; 'The Human Habitat')

clues to past droughts D-152 studies in U.S. climate C-351

Huotington, Harriet E. (born 1909) author and artist, horn Los Angeles Calif.; studied music and dancing Her books for children follow the developing interests of her two sons. 'Let's Go to the Desert'; 'Tune-up'; 'Alrcraft U.S.A.'

Hontingtou, Henry Edwards (1850-1927), railway official and art col-lector, born Oneonta, N.Y.; belector, born Oneonia, A.Y.; bequeathed to public his estate in San Marino, Calif., with one of finest collections of art. English manuscripts and Americana in world museum. See in Index Henry E. Huntington Library and Art

Gallery

Huntington, Samuel (1732-96), signer of Declaration of Independence:

born Windham, Conn.; governor Connecticut (1786-96) signature reproduced D-37

Huntington, Ind., manufacturing city on Little Wabash River, 23 ml. s.w. of Fort Wayne; pop. 15,079; lime, iron and steel products, shoes, rub ber goods; Huntington College: map

Huntington, N. Y., residential area in n. Long Island, 35 mi, from New York City: pop. 9324; includes West Hills, birthplace of Walt Whltman:

Hills, birthplace of Walt Whitman; mop, inset N-204
Huntington, W. Va., largest city of state; on Ohlo River; 45 ml. w. of Charleston; pop. 86,353; rr. shops; glass, Iron, clay, and wood products; Marshall College; mops W-106,

Hantington Library. See in Index Henry E Huntington Library and Art Gallery

Huntington Park, Calif., residential suburb and manufacturing city 10 ml. sw of Lcs Angeles, pop. 29-450, truck farming citrus fruit growing poultry raising, auto supplies, furniture, steel, Iron mop, inset C-35

Huntsman, Benjamin (1704-76), English Inventor and steel manufac-

turer S-138, I-247 Hnntsville, Ala., city 85 ml Birmingham; pop 16,437; farming and stock raising; textiles, cot-ton-seed oil, lumber; rocket re-earch and gulded missile center: State Agricultural and Mechanical Col-

and guided Missile center: State Agricultural and Mcchanical College: A-116, 129, mops A-126, U-253 Hontsville, Tex. city 70 mi. n. of Houston, pop. 9820; cotton trade; state penitentiary; Sam Houston State Teachers College: mop T-90 Hunyady (han'yu-de'), Jamos, or John (1387?-1456), national hero of Hungary, great warrior and statesman; by his defense of Beigrade against the Turks in 1456 made Hungary independent for 70 years: Hungary Independent for 70 years: H-450, T-220

Hupa, an Athapascan Indian tribe of n. California, noted for fine bas-ketry and elaborate costumes.

kerry and elaborate costumes.

Hupeli (ho'be'), province of central
China: 80,190 sq. ml.: pop. 21,034,463: important iron deposits;
Hankow center of China's iron and
steel Industry; cotton, silk, tobacco,
timber: cap. Wuchang: mop C-260
Hura. See in Index Sandbox tree
Hurd, Peter (born 1904), painter,
born Roswell, N.M.; studied with
N. C. Wyeth and married his
daughter Henriette, also a painter;

daughter Henriette, also a painter; especially noted for scenes of especially noted for American Southwest.

Hurdling, racing on foot over sbort distances in which ten hurdles, or light movable fences. have placed; competitor disqualified if three or more hurdles are upset, or If he trails his leg or foot along-side any hurdle: pictures 0-381, T-162

world records, table T-161

Horley, Edward Nosh (1864-1933), manufacturer and public official, born Galesburg, Ill.; chairman Fed-eral Trade Commission; chairman U.S. Shipping Board and president Emergency Fleet Corporation 1917-19.

orley, Patrick Joy (born 1883), lawyer, statesman, and U.S. Army officer, born Choctaw Nation in Horley. officer, born Choctaw Nation in present state of Oklahoma; attorney for Chnctaw Nation 1912-17; served in World War I; helped organize U. S. Chamber of Commerce 1912; U. S. secretary of war 1929-33; first U.S. minister to New National 1912-12; F. D. Becceptation Zealand 1942-43; F. D. Roosevelt's

representative in Middle East 1943. made ambassador to China Nov. 1944; resigned Nov. 1945.

Hnrley, Irish name for hockey.

Hurnn, or Wyandot, tribe of Iroquoian Indians originally living in Ontario along Georgian Bay; driven into upper peninsula of Michigan; iater into lower peninsula and Ohio, now lives in Quebec: map I-106/, toble I-107

Kansas City, Kan., settlement K-16 Ontario, Canada O-387 Huron, S. D., city about 110 ml. e.

of Pierre; pop. 12,788; distributing center for large agricultural and stock-raising area; meat packing: Huron College: maps S-303, U-252-3

Huron (hū'rōn), Lake, 2d largest of the Great Lakes H-451b-52, G-178-85, maps G-179, 181

canals: Sault Sainte Maric S-49; Trent C-109, H-452

Detroit commerce D-75

height and depth, diogrom G-179 comparative. Sec in Index Lakes, toble

Huron College, at Huron S. D.; Presbyterian; founded 1883 at Pierre as Pierre University; name and location changed 1898; arts and selences, musie.

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Hnrst, I'nunie (Mrs. Jacques S. Danielson) (born 1889), author, born Hamilton, Ohio; worked in New York as actress, shop girl, waitress; first won success with short stories, particularly of Jewish life in Ameriea; later wrote novels ('Lummox'; 'A President Is Born'; 'Flve and Ten'; 'Hands of Veronica') and plays ('Humoresque'; 'Land of the Free').

Hurstmonceny Castle, also Herstmoncent Castle, England, site of Royal observatory L-133

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Tracks on a Road', autobiography). Hürtgen (hürt'yön), village in West Germany, 23 mi. w. of Bonn, mop G-88

Hürtgen Forest in World War II TV-283

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in Index Hasan and Husein
Hn Shih (hō' shċ') (born 1891).
Chinesc philosopher and writer; Chinese philosopher and writer; ambassador to U.S. 1937-42; edited Endeavor and Independent Critic; reformed Chinese reformed Chinese classical language into "pai-hau" ("clear talk"); became president of National Peking University 1947: C-276

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American planist and composer;
with his wife, Hildegard Hoffman,
soprano, gave recitals; composed
plano and violiu concertos, songs,
and choral works.

Huss John (about 1369-1415) Bo hemian religions reformer marlyr II 452 picture H 452 John Huss Day k 59 Hussar (hd zor) light horse and

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Hutten (hat en) Utrich von (14881522) German inmunist reformer
poet and ealtrical writer author of
notable Lalin verse member of
Linher s party in Protestant Reformention

mation Hutterian Brethern or Hullerites & Christian sect like he Memoniles except for the r bel ef in the com-mon ownership of things name an Ana comes from Jacob Huller bapital minister who was humed at the stake in Innshruck 1336 fol-lowers flourished in Moravia fled

towers nourished in Moravia ned lo Russia 18th century went to South Dakota 1874 use the German anguage believe in nonviolence live chiefly in rural areas Hulton James (1725-97) Scottish landowher and scotogral pro

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